Annual Groundwater Report

For Calendar Year 2014

Santa Clara Valley Water District

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Executive Summary

This annual Groundwater Report describes groundwater use, levels, quality, storage, and land subsidence in the Santa Clara and Llagas Subbasins for calendar year 2014. Groundwater monitoring data are used to evaluate outcome measures identified in the District's Groundwater Management Plan (GWMP)[1]. These measures help evaluate performance in meeting **Board Water Supply Objective 2.1.1: "Aggressively protect groundwater from the threat of contamination and maintain and develop groundwater to optimize reliability and to minimize land subsidence and salt water intrusion."**

Groundwater provided approximately 50 percent of the water used in the county in 2014, the third year of ongoing drought. To help sustain and protect groundwater supplies, the District:

- Replenished groundwater with 25,800 acre-feet (AF) of local and imported surface water,
- Reduced groundwater demands by over 174,000 AF through treated water deliveries, water conservation, and water recycling,
- Conducted extensive monitoring of water levels, groundwater quality, and land subsidence
- Implemented the well ordinance program and other programs to minimize threats to groundwater quality, and
- Worked with basin stakeholders, land use agencies, and regulatory agencies to protect local groundwater resources.

Table ES-1 shows data for key indicators in 2014 as compared to 2013 and the last five years. Groundwater levels and storage were affected by ongoing extreme dry conditions, with about 81,000 AF withdrawn from groundwater reserves in 2014. Water levels generally decreased as compared to 2013 due to higher pumping and reduced recharge, but were well above historical minimums at index wells. Estimated end of 2014 total groundwater storage was 257,200 AF, which falls in the "Alert" stage or stage 2 of the District's Water Shortage Contingency Plan. Groundwater quality remained very good with the exception of nitrate in South County.

North County Groundwater Summary

Groundwater use was 114,500 AF, increasing 20% from 2013. Pumping location and use remained relatively stable, with nearly all groundwater used for municipal and industrial (M&I) purposes. Groundwater levels decreased due to ongoing drought and increased pumping, but were above historical lows. Groundwater levels were above thresholds established to minimize the risk of land subsidence with the exception of one index well, which went below the threshold between July and October. Estimated groundwater storage at the end of 2014 was 235,700 AF, which was 65,700 AF lower than in 2013.

North County groundwater is generally of very high quality. In 2014, 99% of water supply wells tested met all health-based drinking water standards. The only exceptions were detections of aluminum and nickel above standards in one well. However, subsequent testing indicated aluminum was below the standard and nickel was not detected. It is not uncommon to have a small number of wells with metals or ions above drinking water standards due to local geologic conditions. Public water systems must comply with drinking water standards, which may require treatment or blending prior to delivery.

South County Groundwater Summary

Groundwater pumping in the Coyote Valley and Llagas Subbasin was 10,400 AF and 43,500 AF, respectively. Pumping in the South County decreased by 9% compared to 2013. Similar to 2013, South County groundwater use was about equal in terms of M&I/domestic and agricultural pumping. Groundwater levels were lower than last year but remained well above historical lows at index wells. Estimated groundwater storage at the end of 2014 was 21,500 AF, which is 15,400 AF lower than 2013.

Groundwater quality in South County is generally good with the exception of nitrate, which remains the primary groundwater protection challenge due to historic and ongoing sources. Nitrate was detected above the drinking water standard in about 25% of South County water supply wells tested (primarily domestic wells). For this reason, the outcome measure related to drinking water standards was not met. The District continues to offer basic well testing (including nitrate) to eligible domestic well owners. Salt and Nutrient Management Plans for the Santa Clara and Llagas Subbasins were completed in 2014 in coordination with basin stakeholders. As part of the Safe Clean Water Program, the District also approved six nitrate treatment system rebates for domestic well users exposed to elevated nitrate.

Table ES-1 2014 Groundwater Conditions as Compared to Other Indices

Index[1]	2014	Compared to 2013	Compared to Last 5 Years (2009 - 2013)
Managed Recharge (AF)	25,800	Down 75%	Down 74%
Groundwater Pumping (AF)	168,400	Up 9%	Up 20%
Groundwater as % of Total Water Use	50%	Up 9%	Up 10%
Groundwater Levels (feet)[2]			
Santa Clara Plain	41.33	Down 41%	Down 46%
Coyote Valley	257.71	Down 2%	Down 3%
Llagas Subbasin	193.15	Down 10%	Down 13%
End of Year Groundwater Storage (AF)	257,200	Down 24%	--
Land Subsidence (feet/year)[3]	0.008	Increase	--
Groundwater Quality (mg/L)[4]			
Santa Clara Plain - TDS	410	No Change[5]	Increase
Coyote Valley - TDS	370	No Change	No Change
Llagas Subbasin - TDS	382	No Change	No Change
Santa Clara Plain - Nitrate	13	No Change	No Change
Coyote Valley - Nitrate	15.2	No Change	No Change
Llagas Subbasin - Nitrate	20.5	No Change	No Change

1) Groundwater levels and quality are shown for three groundwater management areas: the Santa Clara Plain and Coyote Valley (which comprise the Santa Clara Subbasin) and the Llagas Subbasin.
2) Groundwater elevations represent the average of all readings at index wells for the time period noted.
3) The established tolerable rate of 0.01 feet per year was not exceeded. Water levels at all subsidence index wells were above these thresholds throughout 2014, except for one well, where the water level was temporarily below the threshold in summer/early fall.
4) Values shown represent median groundwater quality for all principal aquifer zone wells tested. Nitrate is measured as NO_3.
5) Individual wells sampled for TDS and nitrate vary each year so a straight numeric comparison of median values is not performed. "No change" indicates no significant difference using an appropriate statistical test (Mann-Whitney Test) at 95% confidence level. An entry of either "Increase" or "Decrease" indicates a statistically significant change for the time period indicated.

Outcome measures related to groundwater storage, land subsidence, and water quality were met, with the exception of nitrate and chloride. Table ES-2 summarizes outcome measure performance and recommended actions to address measures not being met.

Table ES-2 Summary of 2014 Outcome Measure Performance and Action Plan

Groundwater Storage	**OM 2.1.1.a.** Greater than 278,000 AF of projected end of year groundwater storage in the Santa Clara Plain. Estimated end of 2014 Storage: 235,700 AF **OM 2.1.1.b.** Greater than 5,000 AF of projected end of year groundwater storage in the Coyote Valley. Estimated end of 2014 Storage: 5,400 AF **OM 2.1.1.c.** Greater than 17,000 AF of projected end of year groundwater storage in the Llagas Subbasin. Estimated end of 2014 Storage: 16,100 AF
	Action Plan for OM 2.1.1.a and OM 2.1.1.c: In accordance with the Water Shortage Contingency Plan, the District called for a 20% countywide water use reduction in February 2014. Due to ongoing dry conditions, the savings target was increased to 30% in March 2015.
Groundwater Levels and Subsidence	**OM 2.1.1.d.** 100% of subsidence index wells groundwater levels above subsidence thresholds. All ten subsidence index wells had groundwater levels above thresholds in 2014, with the exception of one well that exceeded the threshold between July and October.
	Action Plan for OM 2.1.1.a: Implement Water Shortage Contingency Plan and increase monitoring frequency.
Groundwater Quality	**OM 2.1.1.e.** At least 95% of countywide water supply wells meet primary drinking water standards. Only 80% of countywide water supply wells tested in 2014 met primary drinking water standards due to elevated nitrate in South County (mainly in domestic wells). If nitrate is not included, 99% of water supply wells met primary drinking water standards. **OM 2.1.1.f.** At least 90% of South County wells meet Basin Plan agricultural objectives. Nearly all wells (98%) met Basin Plan agricultural objectives.
	Action Plan for OM 2.1.1.e: Implement Salt and Nutrient Management Plans to address salt loading, and work to increase participation in the nitrate treatment system rebate program.
Groundwater Quality Trends	**OM 2.1.1.g.** At least 90% of wells in both the shallow and principal aquifer zones have stable or decreasing concentrations of nitrate, chloride, and total dissolved solids. This measure is nearly met for chloride, with 87% of wells showing stable or decreasing concentrations. This measure is met for nitrate as 91% of wells had stable or decreasing concentrations. This measure is met for total dissolved solids as 94% of wells had stable or decreasing concentrations.
	Action Plan for OM 2.1.1.g: Implement Salt and Nutrient Management Plans to address salt loading.

Outcome measure met
Outcome measure not met

Groundwater Outlook

Groundwater levels and storage will continue to decline as dry conditions persist and little surface water is available for managed recharge. Groundwater storage has been critical in helping to meet the county's water supply needs during the ongoing drought. The estimated end of year storage for 2014 was below the 300,000 AF target and water levels approached or temporarily exceeded subsidence thresholds in several index wells. In accordance with the Water Shortage Contingency Plan, the District Board set a 20% water use reduction target in February 2014, which was increased to 30% in March 2015.

The District continues to actively monitor groundwater levels, land subsidence, and water quality to support operational decisions and ensure groundwater resources are protected. To help ensure water supply reliability, the District is also working to expedite several Indirect Potable Reuse (IPR) projects to provide a drought-proof source of purified water for groundwater replenishment. The District will also continue to track proposed legislation, policies, and regulatory standards that may impact groundwater resources or the District's ability to manage them.

1. INTRODUCTION

The Santa Clara Valley Water District (District) has the responsibility and authority to manage the Santa Clara and Llagas Subbasins in Santa Clara County per an act of the California legislature[2]. The District's objectives and authority related to groundwater management are to recharge groundwater basins, conserve, manage and store water for beneficial and useful purposes, increase water supply, protect surface water and groundwater from contamination, prevent waste or diminution of the District's water supply, and do any and every lawful act necessary to ensure sufficient water is available for present and future beneficial uses.

The District Board adopted Water Supply Objective 2.1.1, which reflects the mission to protect groundwater resources: *"Aggressively protect groundwater from the threat of contamination and maintain and develop groundwater to optimize reliability and to minimize land subsidence and salt water intrusion."* Pursuant to the District Act and Board policy, the District has identified the following basin management objectives in the Groundwater Management Plan (GWMP)[3]:

- Groundwater supplies are managed to optimize water supply reliability and minimize land subsidence.
- Groundwater is protected from existing and potential contamination, including salt water intrusion.

Purpose

This annual report describes groundwater conditions in Santa Clara County for calendar year 2014 including groundwater use, water levels, storage, quality, and land subsidence. The following outcome measures (OM) derived from the GWMP are also assessed to evaluate performance in meeting Water Supply Objective 2.1.1:

- OM 2.1.1.a. Greater than 278,000 AF[4] of projected end of year groundwater storage in the Santa Clara Plain.
- OM 2.1.1.b. Greater than 5,000 AF of projected end of year groundwater storage in the Coyote Valley.
- OM 2.1.1.c. Greater than 17,000 AF of projected end of year groundwater storage in the Llagas Subbasin.
- OM 2.1.1.d. 100% of subsidence index wells with groundwater levels above subsidence thresholds.
- OM 2.1.1.e. At least 95% of countywide water supply wells meet primary drinking water standards.
- OM 2.1.1.f. At least 90% of South County wells meet Basin Plan agricultural objectives.
- OM 2.1.1.g. At least 90% of wells in both the shallow and principal aquifer zones have stable or decreasing concentrations of nitrate, chloride, and total dissolved solids.

[2] Santa Clara Valley Water District Act, Water Code Appendix, Chapter 60.
[3] Santa Clara Valley Water District, Groundwater Management Plan, July 2012.
[4] AF = acre-feet. One acre-foot is equal to 325,900 gallons.

Study Area

This report presents information for the Santa Clara and Llagas Subbasins, which are managed by the District and are identified by the California Department of Water Resources as Subbasins 2-9.02 and 3-3.01, respectively (Figure 1). The District divides the Santa Clara Subbasin into two groundwater management areas: the Santa Clara Plain and the Coyote Valley due to land use and management characteristics. Both the Santa Clara Plain and Llagas Subbasin have confined and recharge areas. Within the confined areas, low permeability clays and silts separate shallow and principal aquifers, with the latter defined as aquifer materials greater than about 150 feet below ground surface.

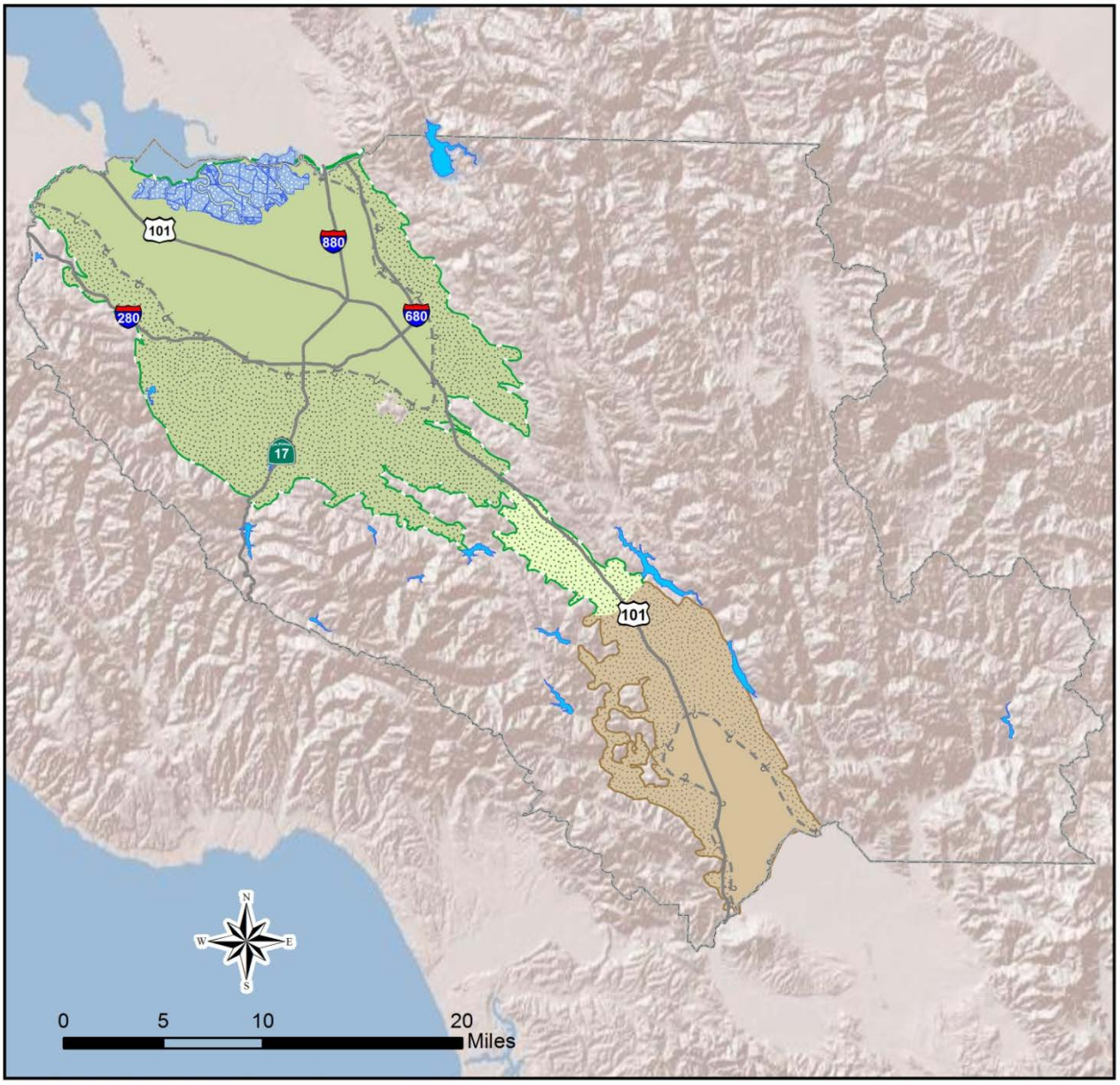
The information in this report is summarized by groundwater management area or by groundwater charge zone (Figure 2). Charge Zone W-2 (North County) generally coincides with the Santa Clara Plain, while Zone W-5 generally overlaps the combined area of the Coyote Valley and Llagas Subbasin.

Report Content

In addition to this Introduction, this Annual Groundwater Report for 2014 includes the following chapters:

- Chapter 2: Groundwater Pumping, Recharge, and Water Balance
- Chapter 3: Groundwater Levels and Storage
- Chapter 4: Land Subsidence
- Chapter 5: Groundwater Quality
- Chapter 6: Other Groundwater Management Activities
- Chapter 7: Conclusions

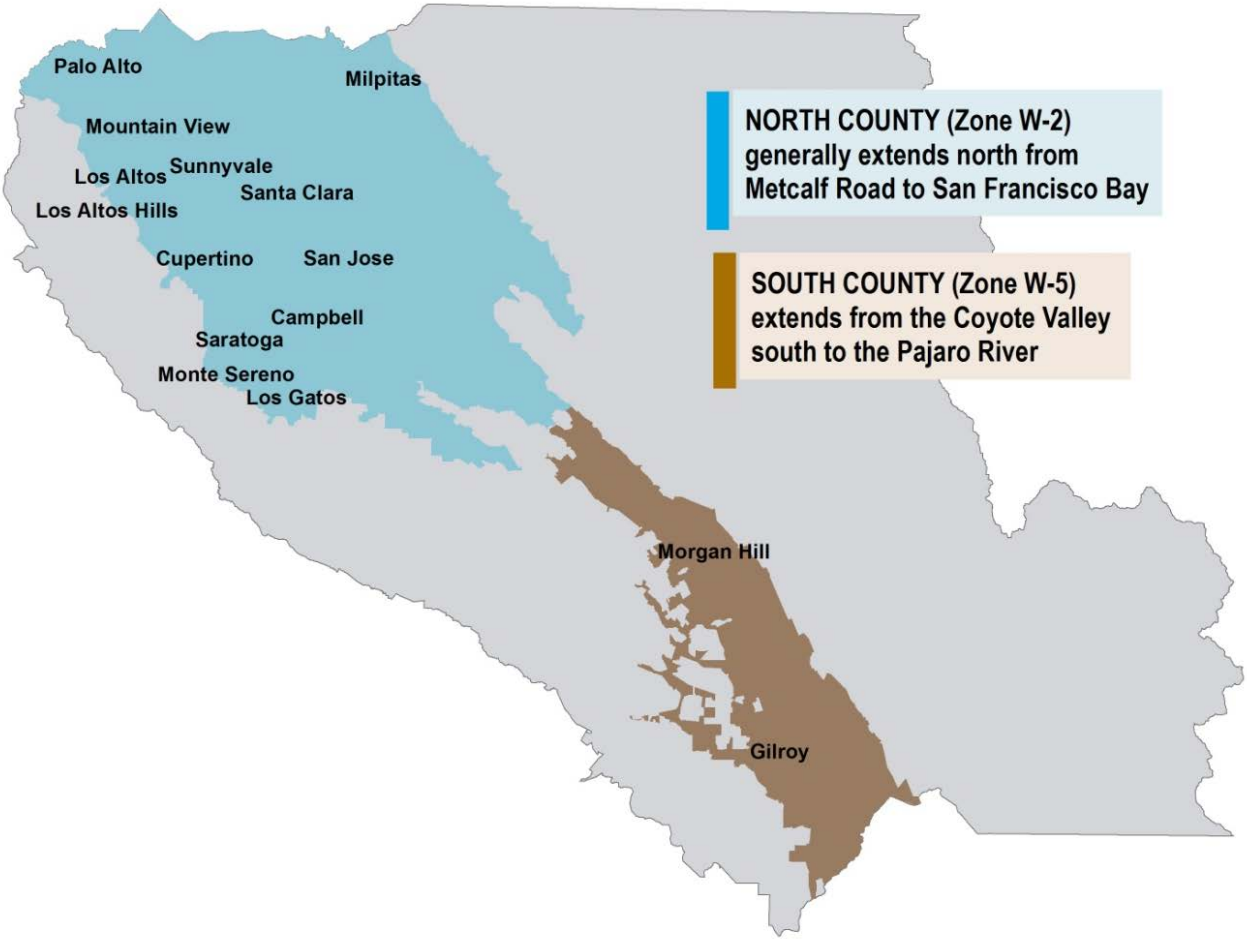
Figure 1 Santa Clara County Groundwater Subbasins



Santa Clara County
Reservoirs
Salt Ponds
Santa Clara Subbasin (DWR Basin 2-9.02)
Llagas Subbasin (DWR Basin 3-3.01)
Approximate Extent of Confined Area
Santa Clara Plain Confined Area
Santa Clara Plain Recharge Area
Coyote Valley Recharge Area
Llagas Confined Area
Llagas Recharge Area

Santa Clara Valley Water District

Figure 2 Groundwater Charge Zones



2. GROUNDWATER PUMPING, RECHARGE, AND WATER BALANCE

Over 168,000 AF of groundwater was pumped in 2014, providing about 50 percent of the water used by county residents and businesses. Compared to 2013, groundwater pumping increased in the Santa Clara Plain and decreased in the Coyote Valley and Llagas Subbasin. Due to limited surface water supplies, the District operated a very limited managed recharge program, using about 26,000 AF of local and imported water to replenish groundwater. In-lieu recharge, including treated water deliveries, recycled water use, and water conservation programs reduced demands on groundwater by over 173,000 AF.

The primary inflow to the subbasins was natural recharge and subsurface inflow, providing over 71% of total inflow. Groundwater pumping accounted for 98% of the subbasin outflows. Due to ongoing dry conditions, outflows exceeded inflows, resulting in a net decrease in storage of about 81,000 AF.

2.1 Groundwater Pumping

Approximately 168,400 AF of groundwater was pumped in Santa Clara County in 2014, compared to 154,600 AF in 2013. Figure 3 shows the location and volume of 2014 groundwater pumping, and Table 1 summarizes pumping by area and use category.

Table 1 2014 Groundwater Pumping by Use (AF)

Use Category	Zone W-2 North County	Zone W-5 South County		Total
	Santa Clara Plain	Coyote Valley	Llagas Subbasin	
Municipal & Industrial (M&I)	113,400	6,950	19,500	139,800
Domestic	200	100	1,300	1,600
Agricultural	900	3,350	22,700	26,900
Total	**114,500**	**10,400**	**43,500**	**168,400**

Groundwater in North County is used primarily for M&I purposes, with minimal agricultural or domestic use. In South County, agricultural use is more significant. This is especially evident in the Llagas Subbasin, where about half of the use is for agriculture. While the quantity of groundwater used for domestic purposes is relatively small in South County, there is a large number of individual wells that reported groundwater use (Table 2).

Table 2 Wells Reporting Groundwater Use in 2014

Use Category	Zone W-2 North County	Zone W-5 South County	
	Santa Clara Plain	Coyote Valley	Llagas Subbasin
Municipal & Industrial (M&I)	705	58	256
Domestic	384	333	2,688
Agricultural	39	88	574

Note: Some wells may report pumping for more than one use category (e.g., domestic and agricultural).

Groundwater Pumping Trends

Groundwater pumping is largely offset by the District's managed recharge of local and imported surface water in normal or wet years (Figure 4). Over the last 25 years, managed recharge has averaged 66% of the amount of groundwater pumped.

Countywide groundwater pumping rose 9% from the previous year, mainly due to higher use in the Santa Clara Plain (Table 3), where pumping increased by 20%. Coyote Valley and Llagas Subbasin pumping decreased by 8% and 9%, respectively. Total water use decreased in 2014 in all three groundwater areas due to water use reduction efforts in response to the drought. Since groundwater is the only potable water supply for Coyote Valley and Llagas Subbasin, the decrease in total water use is reflected in pumping. For the Santa Clara Plain, water savings were primarily from District treated water and Hetch-Hetchy water deliveries, while pumping increased. Groundwater provided about 50% of the water used countywide in 2014, and pumping has increased over the last several years due to the drought (Figure 5).

Groundwater pumping and use patterns over time are shown in Figure 6 for each of the groundwater management areas. In the Santa Clara Plain, a significant drop in groundwater pumping is noted in the late 1980s following completion of the District's Santa Teresa Water Treatment Plant (WTP). Since then, pumping has averaged about 100,000 AF per year in the Santa Clara Plain. A notable increase in pumping in the Coyote Valley occurred in 2006 when a water retailer installed new wells and began extracting water to serve customers in the Santa Clara Plain. This increased the average annual pumping volume by about 5,000 AF. Pumping in the Llagas Subbasin has remained relatively stable over the period of record.

Major Groundwater Users

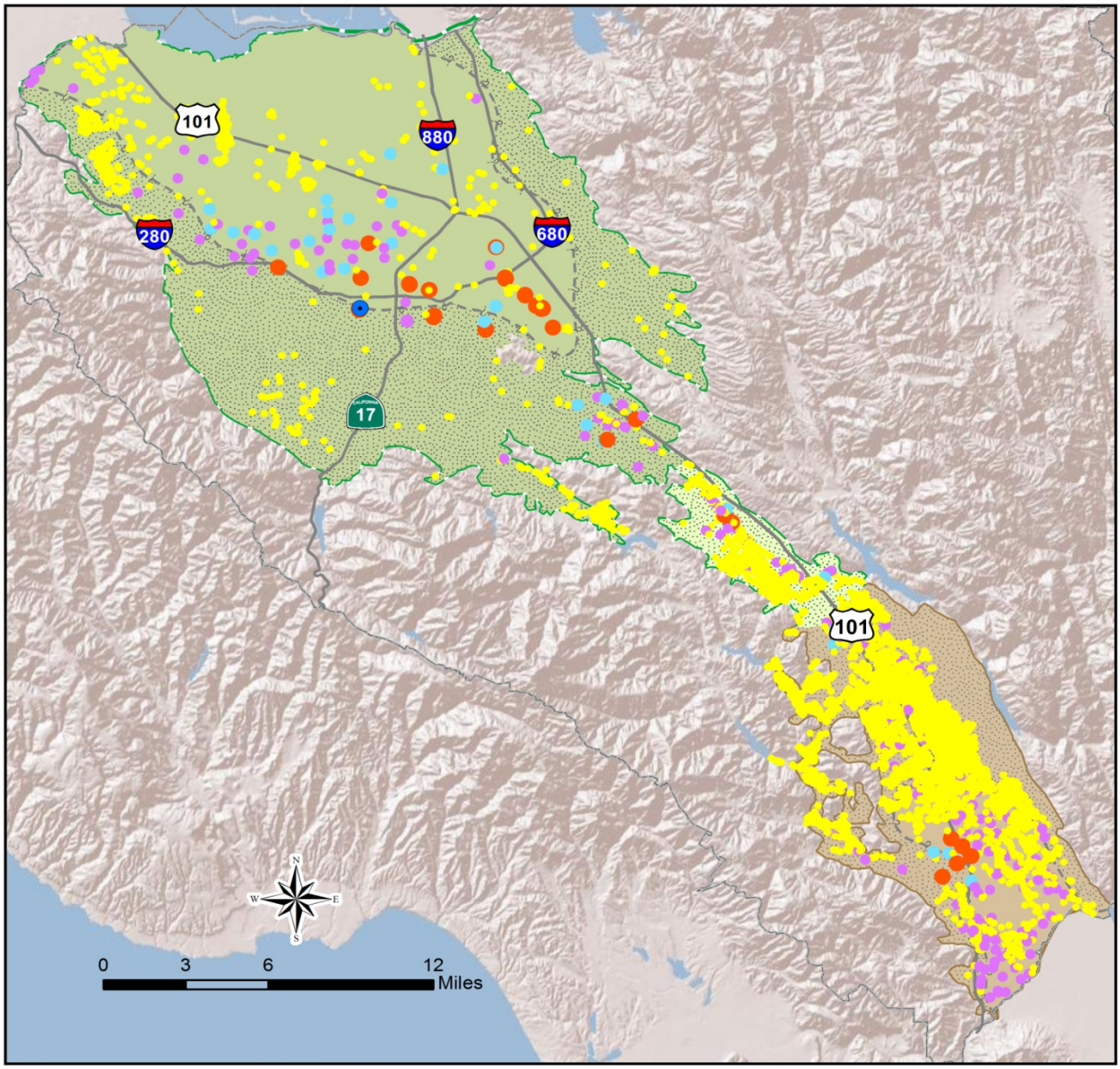
The largest groundwater users in each charge zone are shown on Figure 7. Water retailers are the primary users in North County, accounting for over 90% of all pumping. San Jose Water Company is the largest individual user, followed by other retailers and a few large industrial users. Unlike North County, about half of pumping in South County is from numerous individual pumpers including agricultural and domestic users. In South County, water retailer pumping accounts for about 37% of groundwater use. Other large users include golf courses and industrial users.

Table 3 2014 Groundwater Pumping Compared to Other Indices (AF)

Groundwater Subbasin/Area	2014	2013	5 Year Average (2009-2013)	Period of Record (Average)
Santa Clara Subbasin, Santa Clara Plain	114,500	95,300	85,000	116,200
Santa Clara Subbasin, Coyote Valley	10,400	11,300	12,300	8,700
Llagas Subbasin	43,500	48,000	42,900	42,700
Total	**168,400**	**154,600**	**140,200**	**167,600**

Note: The period of record is 1981-2014 for the Santa Clara Plain and 1988-2014 for the Coyote Valley and Llagas Subbasin.

Figure 3 **2014 Groundwater Pumping (AF)**



Groundwater Production (AF)

- 0.0 - 100.0
- 100.1 - 500.0
- 500.1 - 1000.0
- 1000.1 - 10000.0
- 10000.1 - 15000.0

- Santa Clara County
- Santa Clara Subbasin (DWR Basin 2-9.02)
- Llagas Subbasin (DWR Basin 3-3.01)
- Approximate Extent of Confined Area

- Santa Clara Plain Confined Area
- Santa Clara Plain Recharge Area
- Coyote Valley Recharge Area
- Llagas Confined Area
- Llagas Recharge Area

Santa Clara Valley Water District

Figure 4 **Countywide Groundwater Pumping and Managed Recharge (AF)**

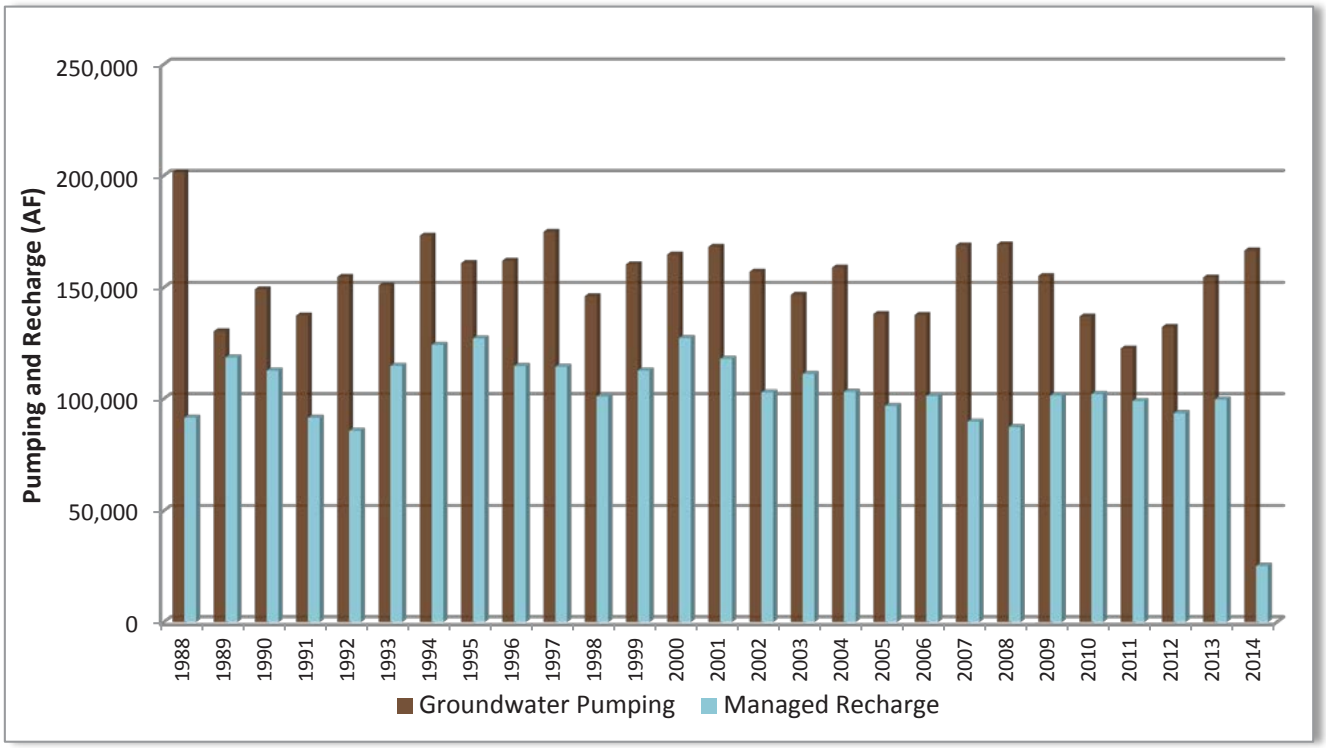


Figure 5 **Countywide Water Use**

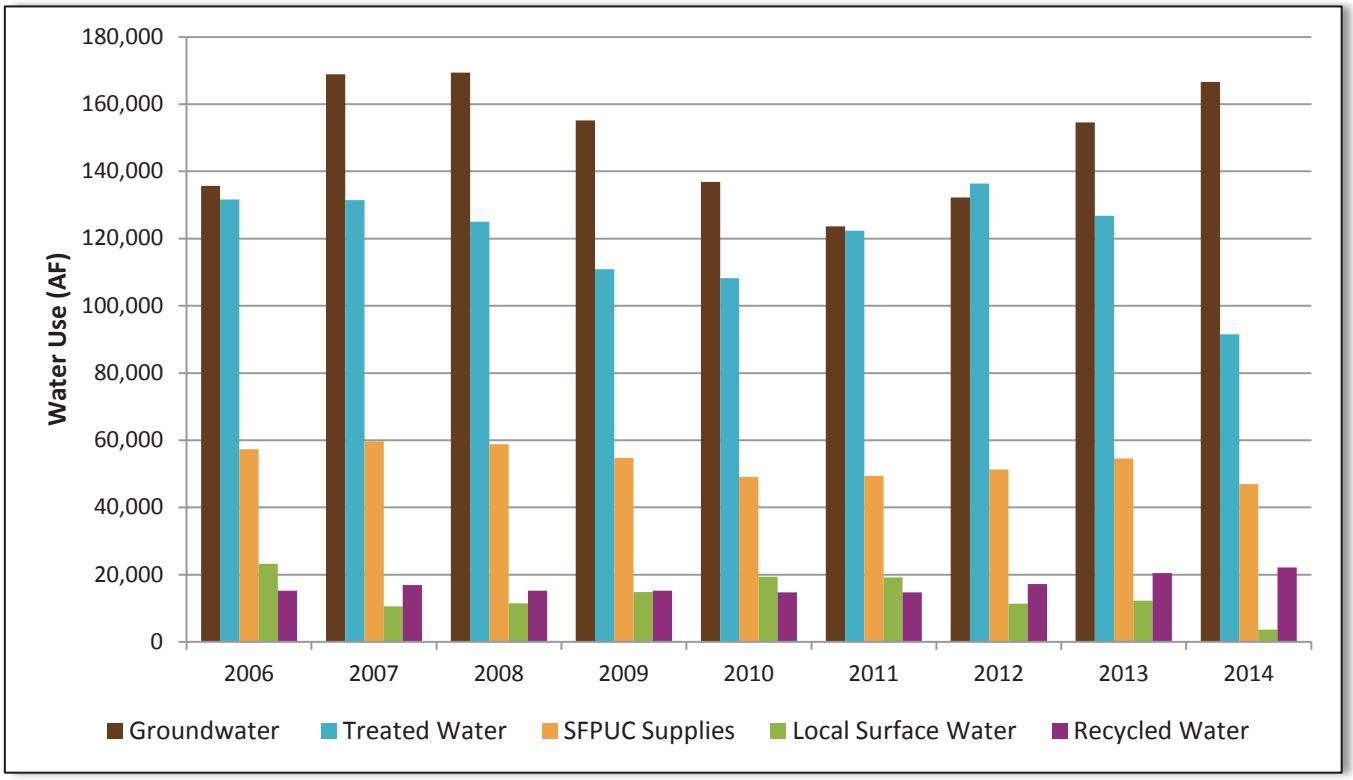


Figure 6 Groundwater Pumping by Use (AF)

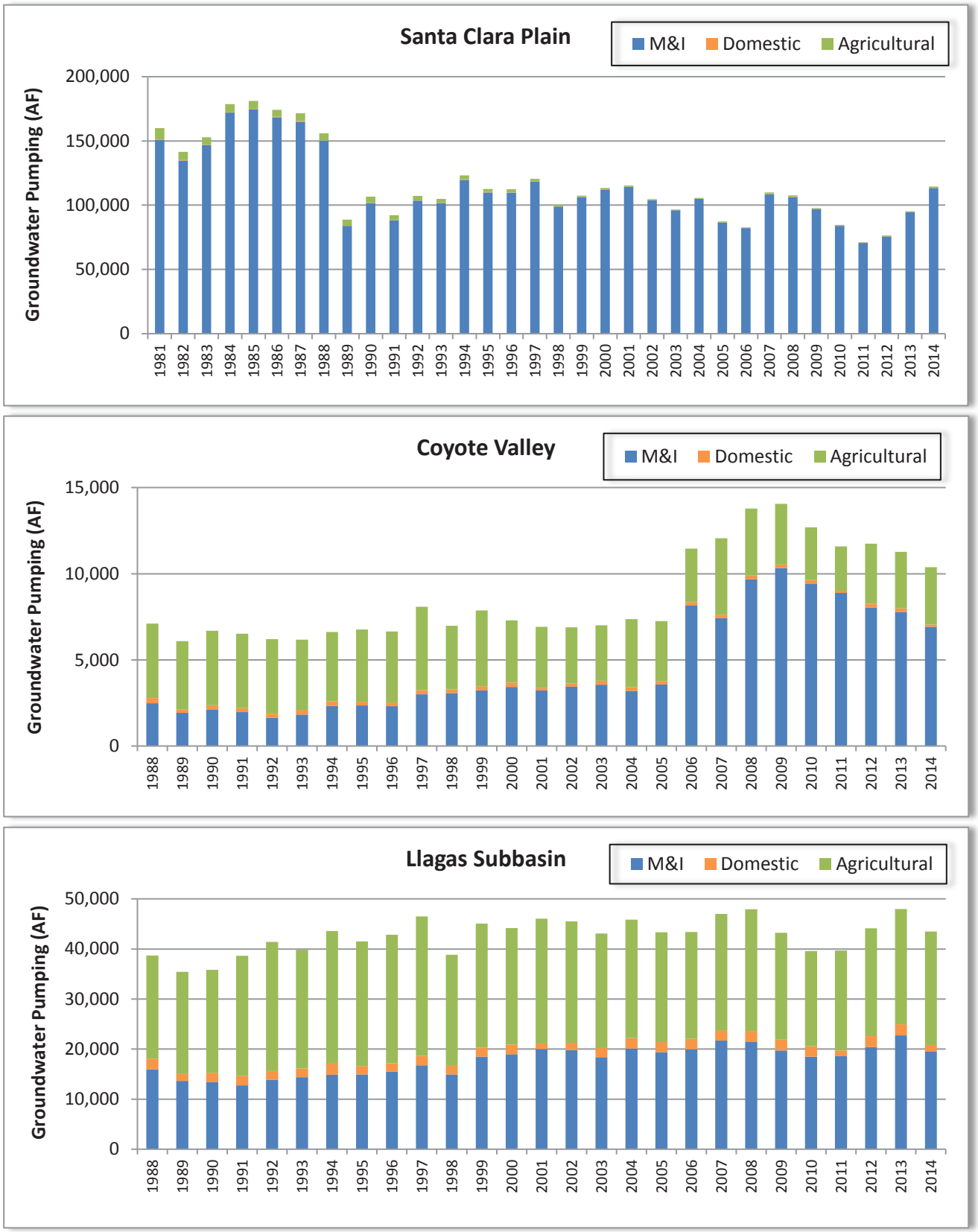
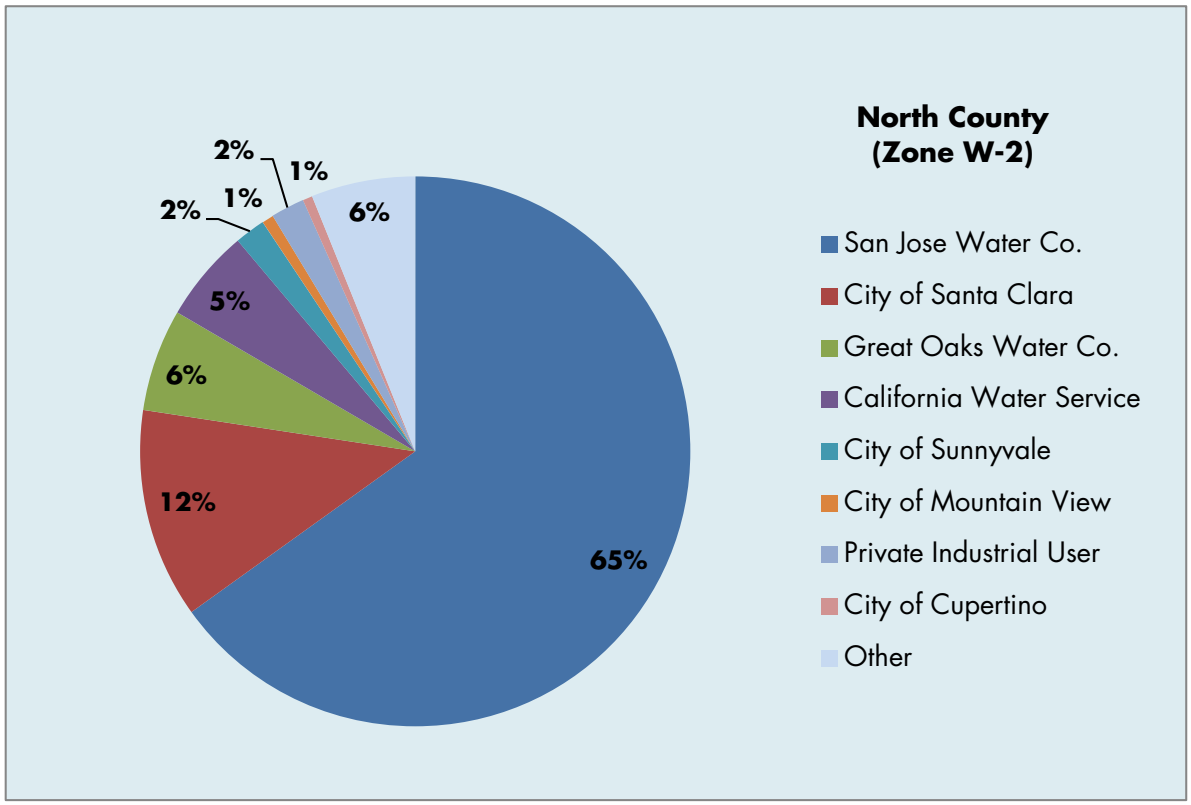
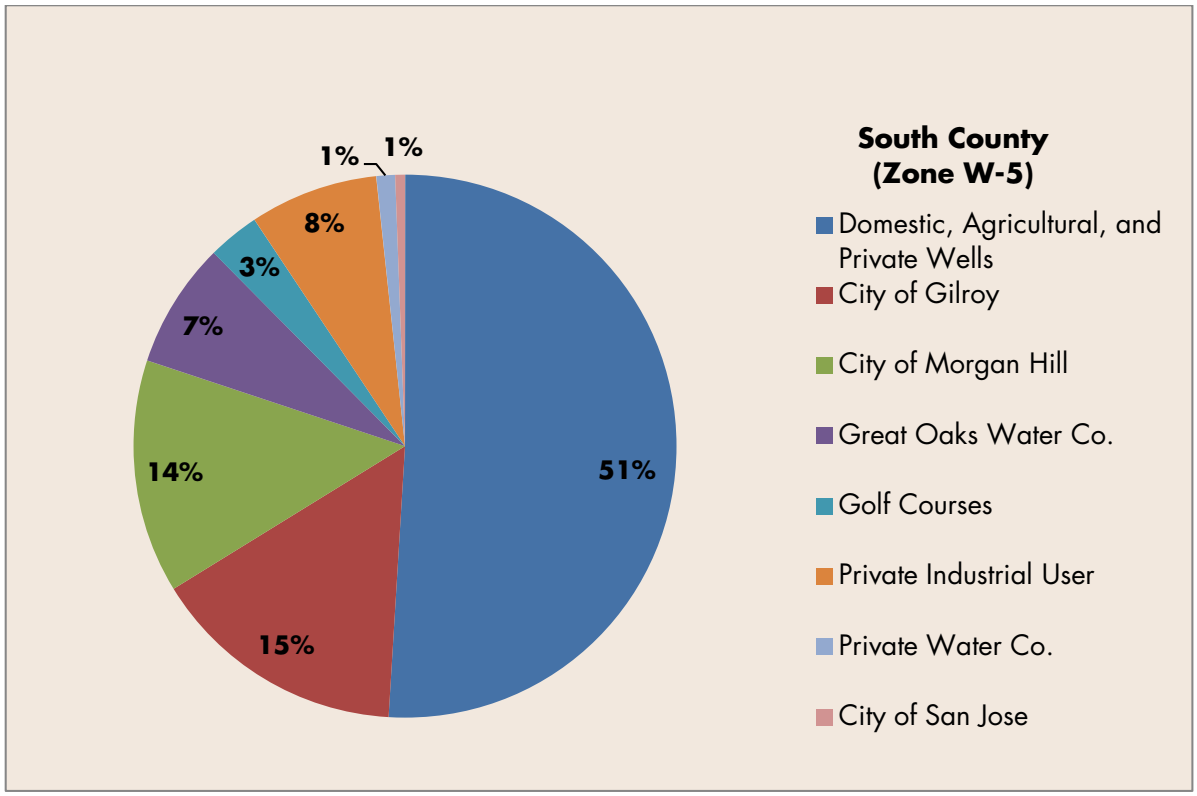


Figure 7 Percent of Total Pumping by Major Groundwater Users in 2014





2.2 Groundwater Recharge

Since the 1930s, the District's water supply strategy has been to maximize the conjunctive management of surface water and groundwater. The annual amount of groundwater pumped far exceeds what is replenished naturally by rainfall, so the District's managed recharge and in-lieu recharge activities are critical to ensuring water supply reliability.

Managed Recharge

The District replenishes the groundwater subbasins with imported water and runoff captured in 10 local reservoirs. District recharge facilities include more than 300 acres of recharge ponds and over 90 miles of creeks (Figure 8). Imported sources include the federal Central Valley Project (CVP) and the State Water Project (SWP).

About 25,800 AF of local and imported water was recharged through District facilities in 2014 (Table 4). This represents only about 25% of a typical managed recharge program. The low recharge volume was due to limited supplies of local and imported surface water. The majority of District managed recharge was in-stream recharge (90%). Approximately equal amounts of local and imported water were recharged in North County, while imported water accounted for approximately two-thirds of the water recharged in South County (Figure 9). The use of imported or local water for managed recharge depends on a number of factors including hydrology, imported water allocations, treatment plant demands, and environmental needs. In general, a greater percentage of local water is used for recharge in wet years due to increased capture of local storm runoff in local reservoirs.

Operating restrictions have been imposed on several District reservoirs while seismic stability is analyzed, limiting the amount of local water that can be stored for groundwater recharge. Major upcoming capital projects include seismic retrofit of Anderson, Calero, and Guadalupe dams.

Table 4 2014 Managed Recharge (AF)

Zone	In-Stream Recharge (Creeks)	Off-Stream Recharge (Recharge Ponds)	Total
W-2 (North County)	9,300	1,600	10,900
W-5 (South County)	13,800	1,100	14,900
Total	23,100	2,700	25,800

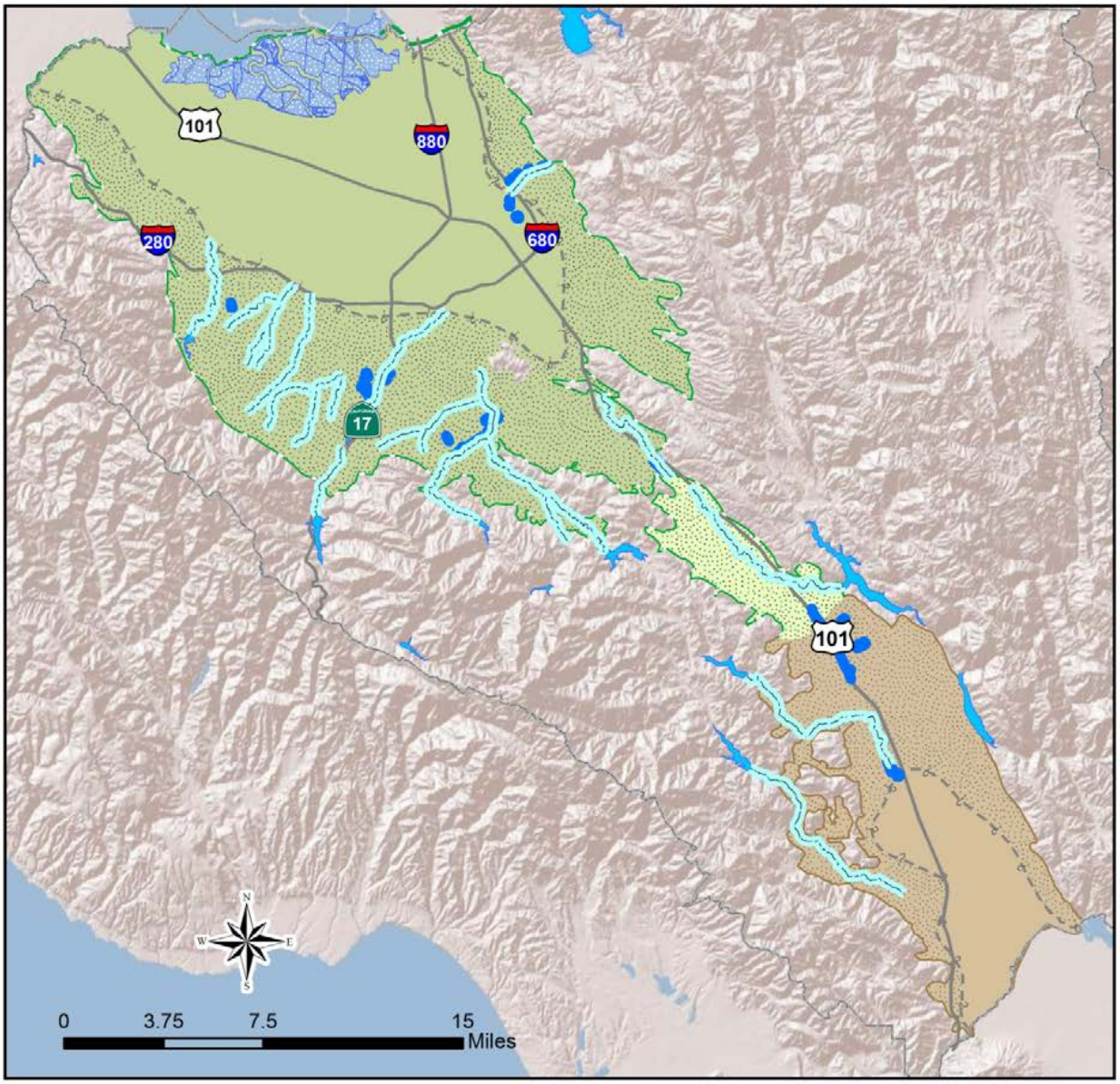
In-Lieu Recharge

The District's treated surface water deliveries, water conservation, and recycled water programs play a critical role in maintaining groundwater storage by reducing demand on groundwater. In 2014, treated water and recycled water provided about 91,500 and 22,100 AF of water, respectively. The District's water conservation programs also saved approximately 60,000 AF[5].

The District's Silicon Valley Advanced Water Purification Center began operating in 2014. This state-of-the-art facility in San Jose produces up to 8 million gallons per day of highly purified water by treating municipal wastewater with microfiltration, reverse osmosis, and ultraviolet light. This facility supports the District's goal of expanding the use of recycled water, which reduces the demand on groundwater.

[5] Santa Clara Valley Water District, FY 2015-16 Protection and Augmentation of Water Supplies, February 2015.

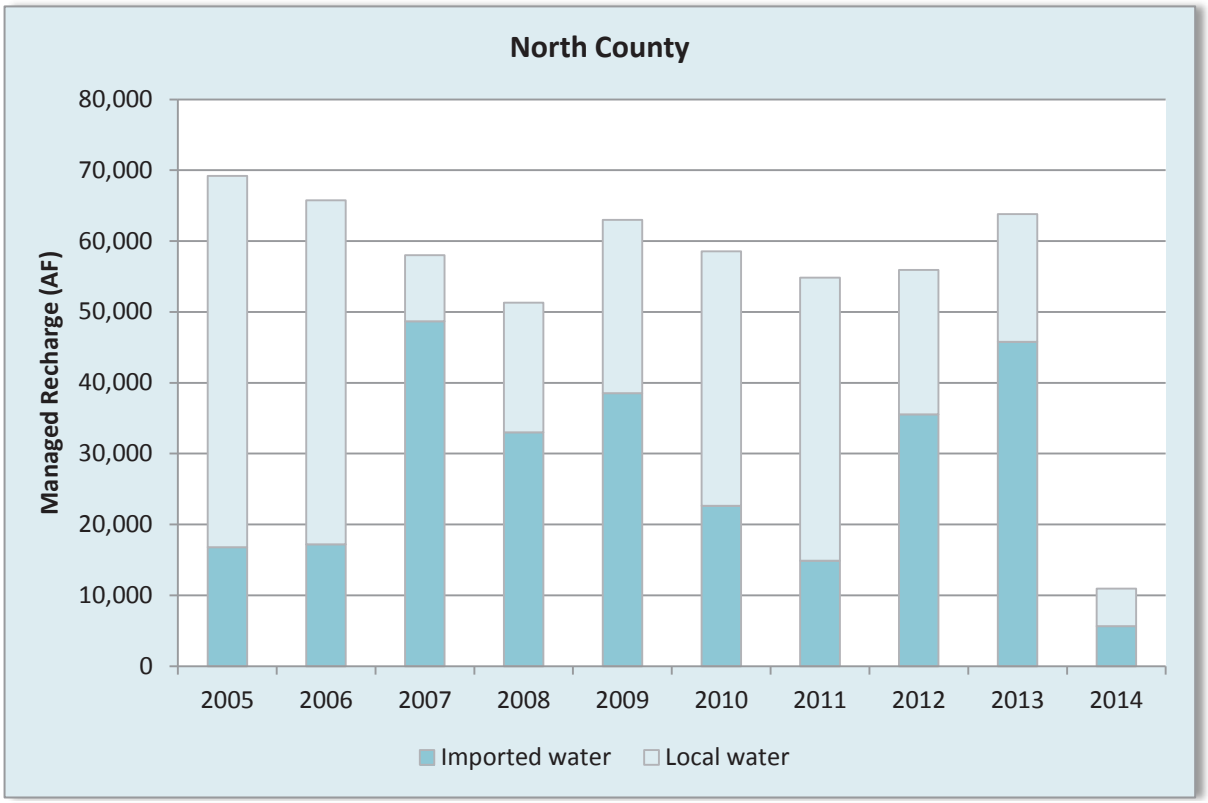
Figure 8 District Managed Recharge Facilities

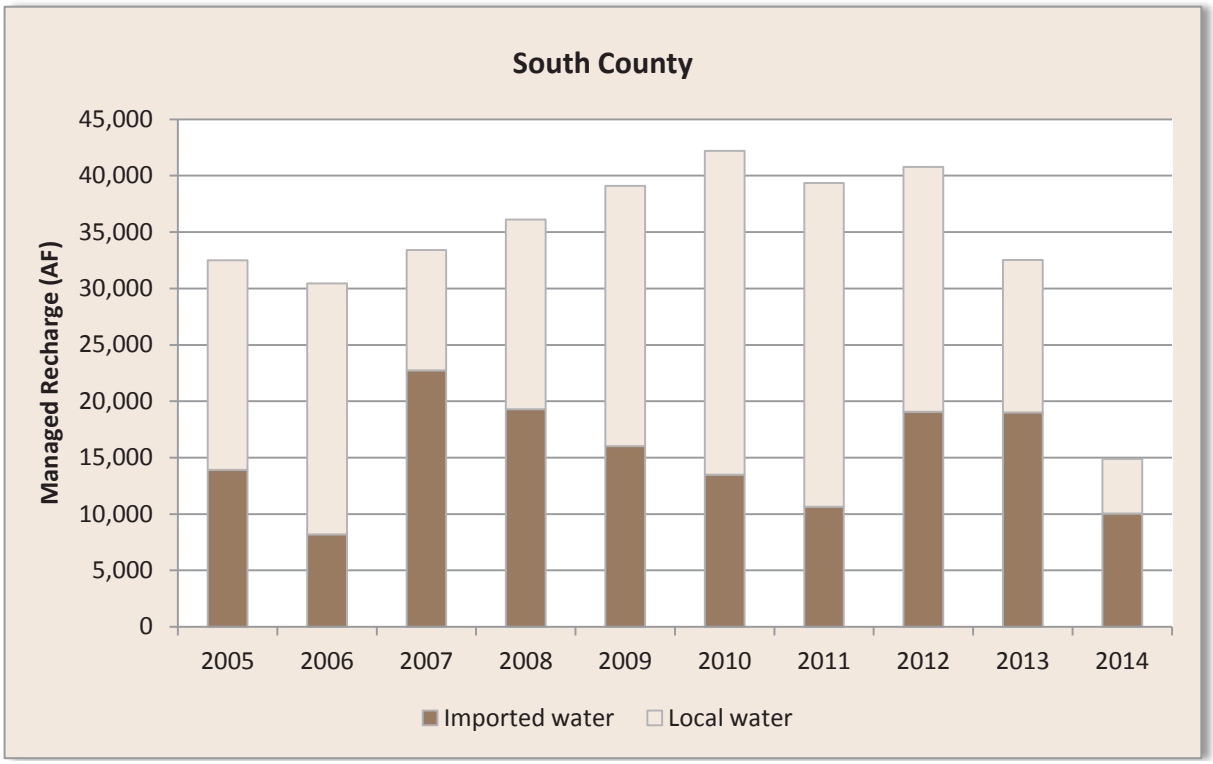


Santa Clara County
Instream Recharge
District Recharge Ponds or Facilities
Reservoirs
Salt Ponds
Santa Clara Subbasin (DWR Basin 2-9.02)
Llagas Subbasin (DWR Basin 3-3.01)
Approximate Extent of Confined Area
Santa Clara Plain Confined Area
Santa Clara Plain Recharge Area
Coyote Valley Recharge Area
Llagas Confined Area
Llagas Recharge Area

Santa Clara Valley Water District

Figure 9 Managed Recharge by Source (AF)





2.3 Groundwater Balance

The groundwater balance provides an assessment of annual inflows and outflows for the Santa Clara Plain, Coyote Valley, and Llagas Subbasin, as shown in Figure 10. It should be noted that many terms presented in the groundwater balance cannot be directly measured and represent estimated values from the District's groundwater flow models.

Inflows

Major inflows to the subbasins are primarily controlled by hydrologic conditions and include:

- Managed recharge by the District using local and imported surface water,
- Natural recharge, which includes deep percolation of rainfall, natural seepage through creeks, subsurface inflow from adjacent aquifer systems, and return flows from septic systems and irrigation.

Total inflows to the subbasins were 91,600 AF in 2014, with natural recharge and other inflows providing almost 72% of the total. Managed recharge provided about 28% of total inflows, due to extremely limited surface water supplies caused by the drought.

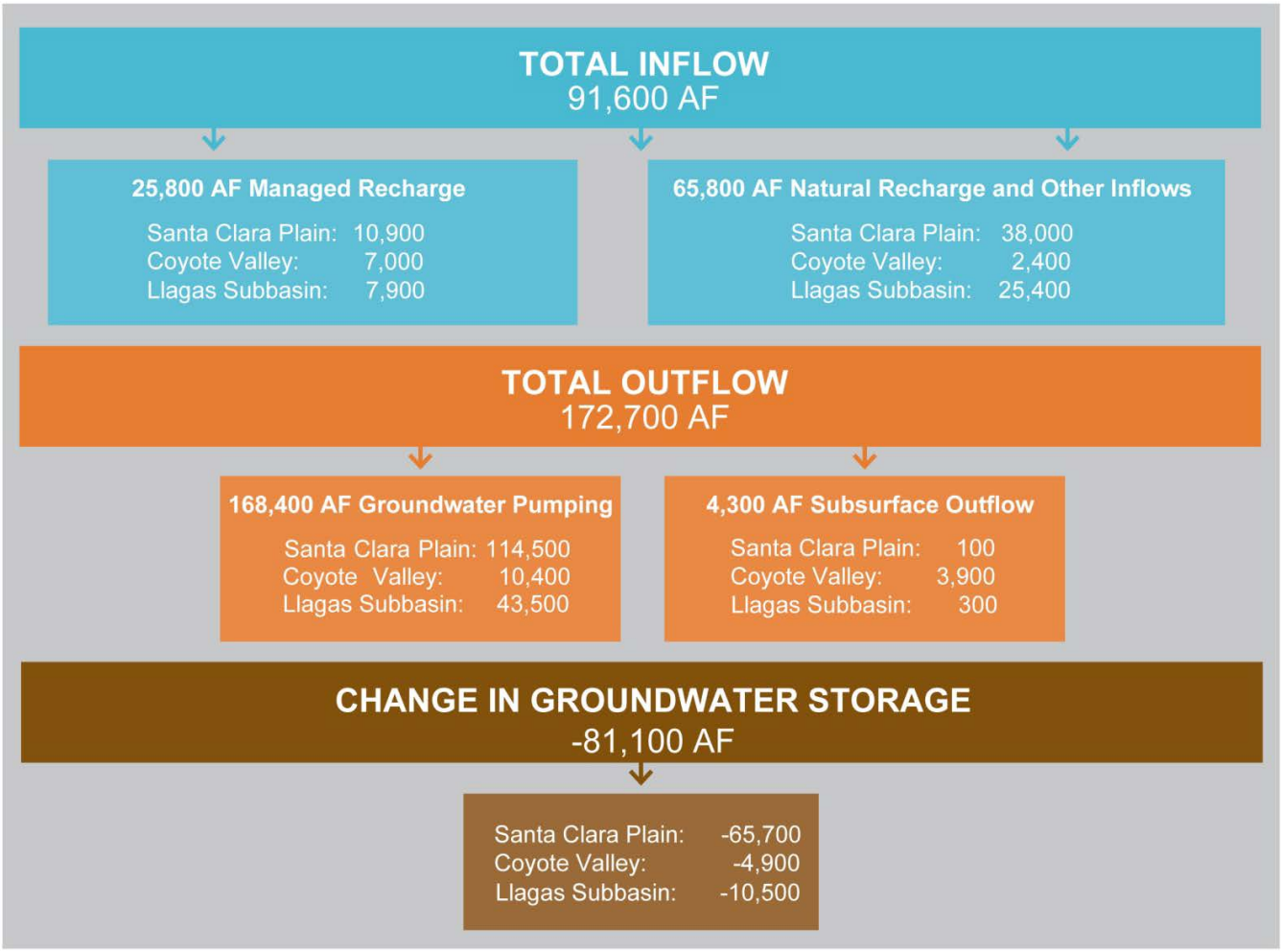
Outflows

The primary outflow of groundwater is due to pumping, which accounted for 98% of the total outflow of 172,700 AF in 2014. Subsurface outflow to adjacent aquifer systems was about 4,300 AF, or 2% of the total outflow.

Change in Storage

Based on the estimated inflows and outflows, there was an estimated decrease in storage of 81,100 AF in 2014 due to ongoing dry conditions and increased reliance on groundwater reserves. Storage in the Santa Clara Plain, Coyote Valley, and Llagas Subbasin decreased by about 65,700 AF, 4,900 AF, and 10,500 AF respectively.

Figure 10 2014 Groundwater Balance



Notes:

1) Groundwater balance terms presented are estimates based on calibrated groundwater flow models and values are rounded to the nearest 100 AF.
2) Managed recharge represents direct replenishment by the District using local and imported water. Estimates from the groundwater models may differ slightly from surface water accounting estimates.
3) Natural recharge and other inflows include the deep percolation of rainfall, septic system and/or irrigation return flows, natural seepage through creeks, and inflow from adjacent aquifer systems.
4) The groundwater pumping estimate is based on pumping reported by water supply well owners.
5) Subsurface outflow represents outflow to adjacent aquifer systems. In the Santa Clara Plain, this includes outflows to San Francisco Bay. In Coyote Valley, this includes outflow to the Santa Clara Plain, and in the Llagas Subbasin, this includes outflows to the Bolsa Subbasin in San Benito County.

3. GROUNDWATER LEVELS AND STORAGE

The District collected monthly water level measurements from over 200 wells in 2014, and also evaluated water levels from over 80 wells measured by water retailers. Groundwater levels at regional index wells were up to 30 feet lower than 2013 due to ongoing dry conditions, but remained above historical minimums. Estimated end of year groundwater storage decreased by 81,100 AF from last year due to limited recharge and increased pumping in the Santa Clara Plain. The GWMP storage target was not met for the Santa Clara Plain or Llagas Subbasin in 2014 and the projected end of year storage for 2015 is below the 300,000 AF target. In accordance with the Water Shortage Contingency Plan, the District set a 20% water use reduction target in February 2014, which was increased to 30% in March 2015.

3.1 Groundwater Levels

Comprehensive and accurate monitoring data allows the District to evaluate groundwater level and storage conditions to support operational decisions and water supply planning efforts. The District measured depth to water data from over 200 wells on a daily or monthly basis as shown in Figure 11[6]. The District also evaluated water levels from over 80 water supply wells measured by water retailers. As the designated monitoring entity for Santa Clara County under the California Statewide Groundwater Elevation Monitoring (CASGEM) program, the District uploaded almost 1,100 groundwater elevation measurements to the CASGEM website in 2014.

Three index wells are used to represent regional groundwater elevations in the Santa Clara Plain, Coyote Valley, and the Llagas Subbasin (Figure 11). Table 5 shows March and October groundwater elevations for the index wells, which typically represent the seasonal high and low groundwater elevations, respectively. Due to continued dry conditions, average groundwater elevations were 5 to 35 feet lower than the previous year and the five-year average, although they remained above the historically observed minimums and levels seen during the last major drought of 1987-1992 (Figure 12). Groundwater elevations were above the thresholds established to minimize the risk of land subsidence in 9 of the 10 subsidence index wells (see Section 4). In two subsidence index wells, groundwater elevations were within 20 feet of their subsidence thresholds in 2014, and the threshold was temporarily exceeded in one well.

Groundwater elevation contours for the principal aquifer zone in March and October of 2014 are shown in Figures 13 and 14, respectively. These figures show the typical seasonal pattern of higher groundwater levels in the spring and lower levels in the fall due increased pumping and less natural recharge in the summer and fall.

In the Santa Clara Subbasin, groundwater elevations are highest in the Coyote Valley and the recharge areas of the Santa Clara Plain. Groundwater elevations generally decrease within the interior, confined area of the subbasin, and the general groundwater flow direction is northwest toward San Francisco Bay. The District's managed recharge helps maintain adequate pressure in the principal aquifer zone such that groundwater flows toward the bay and keeps salt water from intruding inland.

[6] In 2014 the District increased the monitoring frequency for all wells to monthly in light of ongoing, extreme dry conditions.

Table 5 Groundwater Elevations at Index Wells (feet above mean sea level)

Groundwater Subbasin/Area	Index Well	March 2014	October 2014	2014 Average	2013 Average	5 Year Average (2009-2013)	Period of Record Average
Santa Clara Subbasin, Santa Clara Plain	07S01W25L001	58.42	29.43	41.33	70.45	76.57	6.28
Santa Clara Subbasin, Coyote Valley	09S02E02J002	261.73	251.33	257.71	262.97	265.98	264.46
Llagas Subbasin	10S03E13D003	206.66	180.25	193.15	214.28	221.26	219.59

Note: The period of record for the index wells is 1936-2014 for the Santa Clara Plain, 1948-2014 for the Coyote Valley, and 1969-2014 for the Llagas Subbasin.

In the Santa Clara Subbasin, groundwater elevations are highest in the Coyote Valley and the recharge areas of the Santa Clara Plain. Groundwater elevations generally decrease within the interior, confined area of the subbasin, and the general groundwater flow direction is northwest toward San Francisco Bay. The District's managed recharge helps maintain adequate pressure in the principal aquifer zone such that groundwater flows toward the bay and keeps salt water from intruding inland.

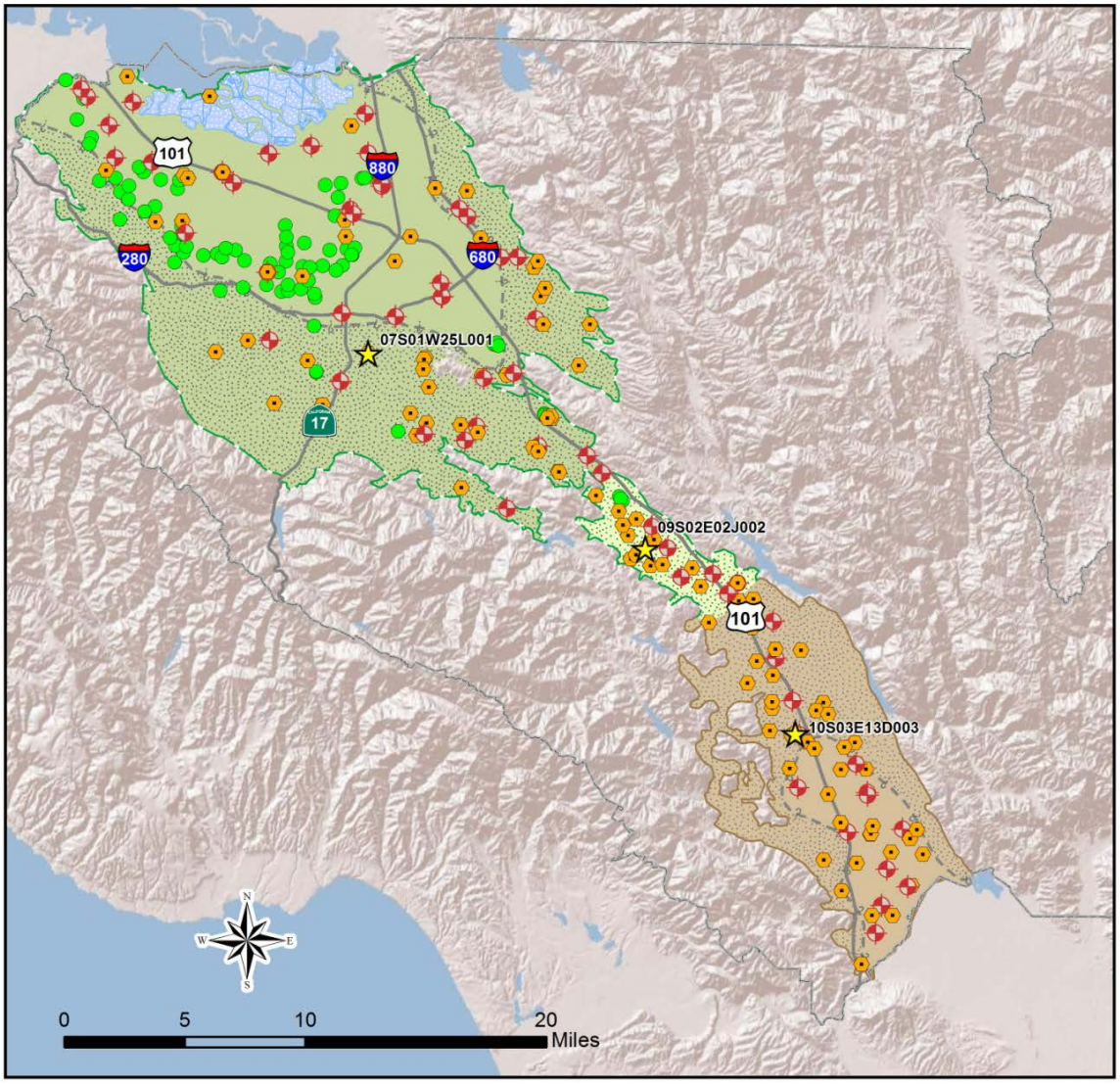
The groundwater flow patterns observed in Coyote Valley and along the basin boundaries in the Santa Clara Plain were similar to those observed in the past. However, the October 2014 contours indicate that groundwater elevations in the interior of the Santa Clara Plain were significantly lower than in October 2013; this is likely due to decreased recharge activities and increased groundwater pumping in response to the drought.

The highest groundwater elevations in the Llagas Subbasin are in the recharge area in Morgan Hill, and groundwater generally flows southeast toward the Pajaro River and San Benito County. Managed and natural recharge within the recharge area maintains groundwater pressures within the confined area, where groundwater exists in partially to fully confined conditions.

3.2 Groundwater Storage

Groundwater storage at the end of 2014 was below the GWMP outcome measure of 300,000 AF and 81,100 AF lower than 2013 (Table 6). End of year groundwater storage of less than 300,000 AF indicates a potential for water shortages per the District's Water Shortage Contingency Plan. Due to ongoing dry conditions, the projected end of year storage for 2015 is below the 300,000 AF target. In accordance with the Water Shortage Contingency Plan, the District Board has set a 30% water use reduction target for 2015.

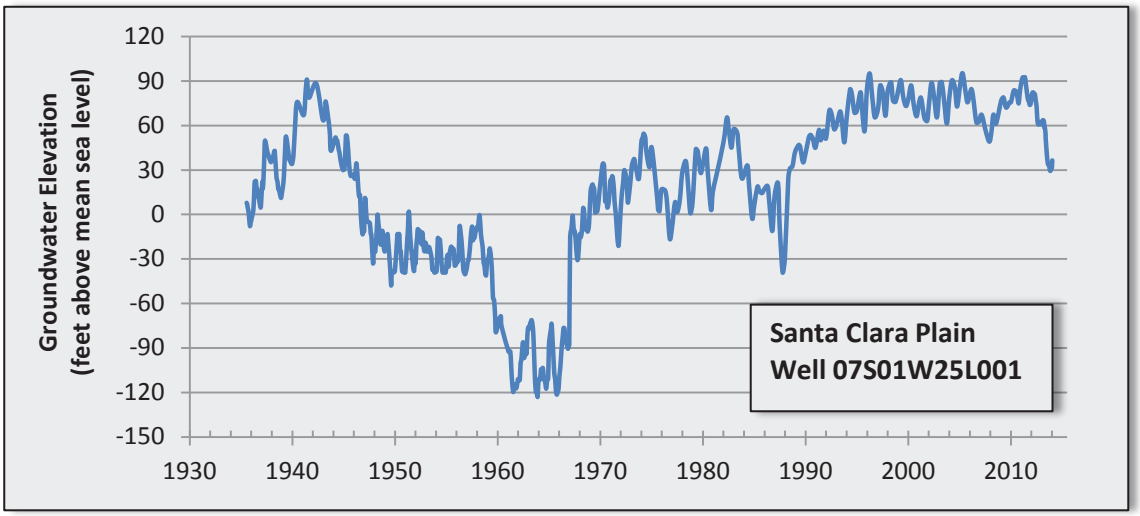
Figure 11 2014 Groundwater Level Monitoring

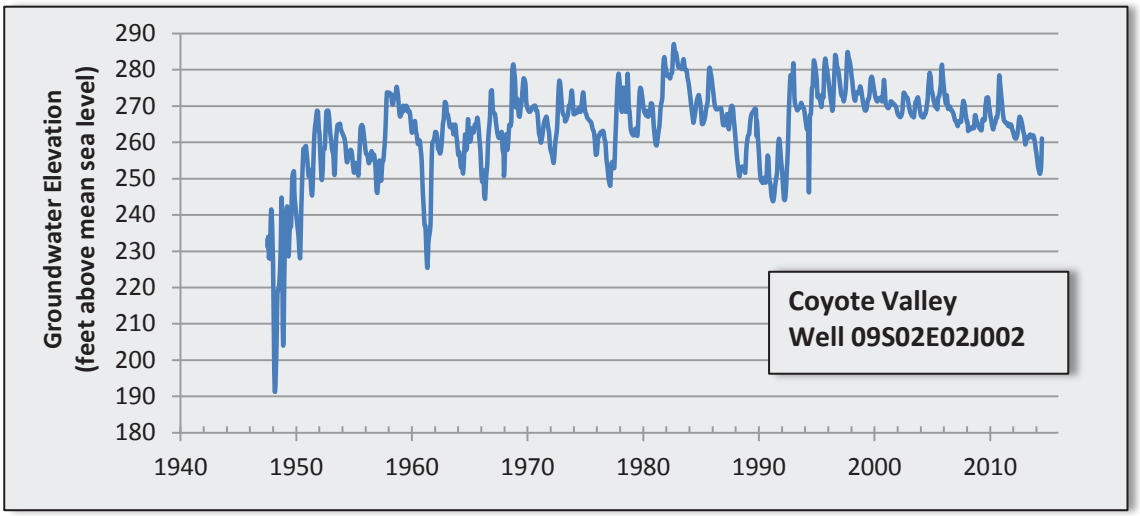


Index Well
Automated Reading
Manual Reading
Wells Measured by Water Retailers
Salt Ponds
Santa Clara County
Approximate Extent of Confined Area
Santa Clara Plain Confined Area
Santa Clara Plain Recharge Area
Coyote Valley Recharge Area
Llagas Confined Area
Llagas Recharge Area
Santa Clara Subbasin (DWR Basin 2-9.02)
Llagas Subbasin (DWR Basin 3-3.01)

Santa Clara Valley Water District

Figure 12 Groundwater Elevations at Index Wells (feet above mean sea level)





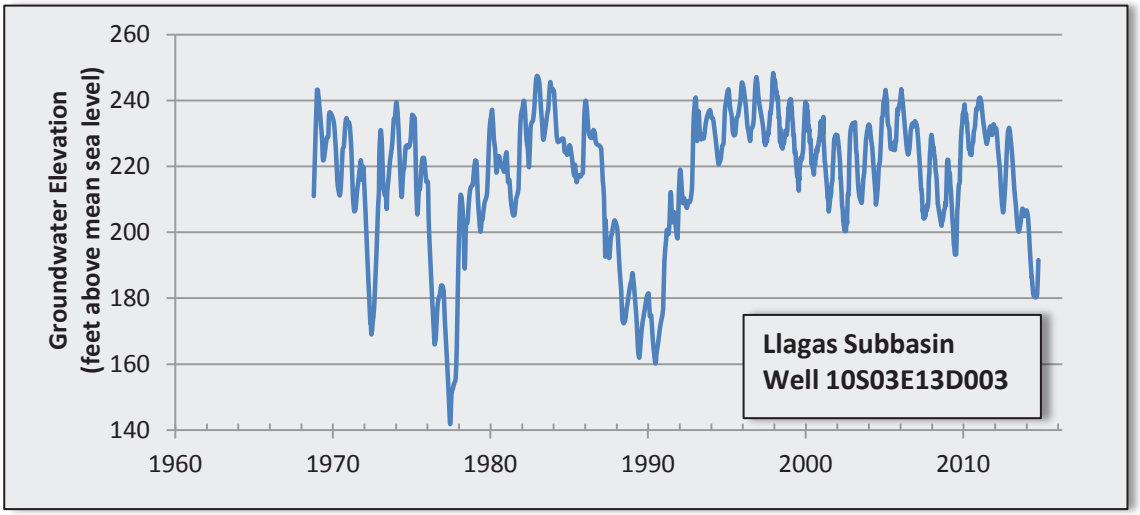
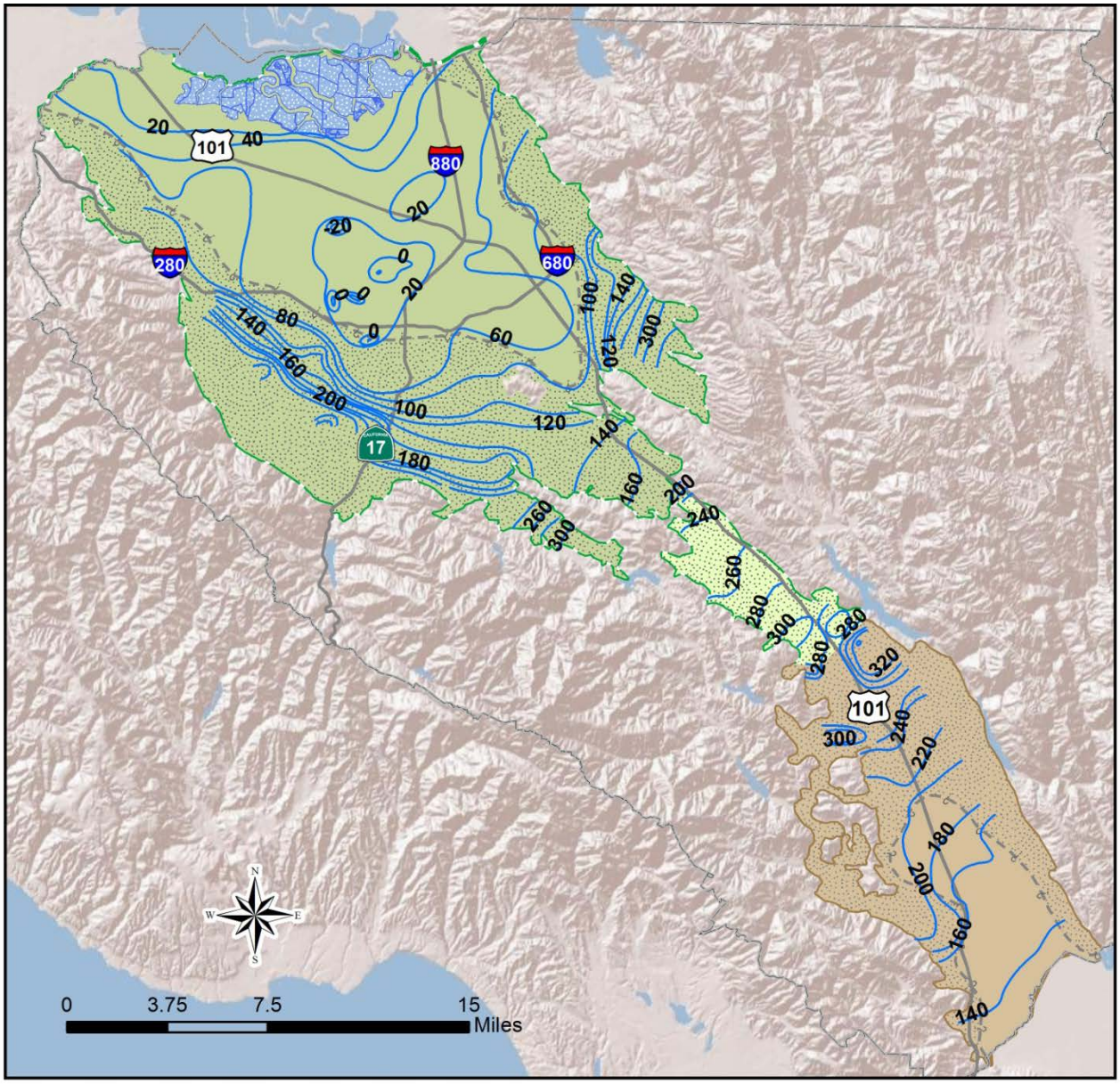


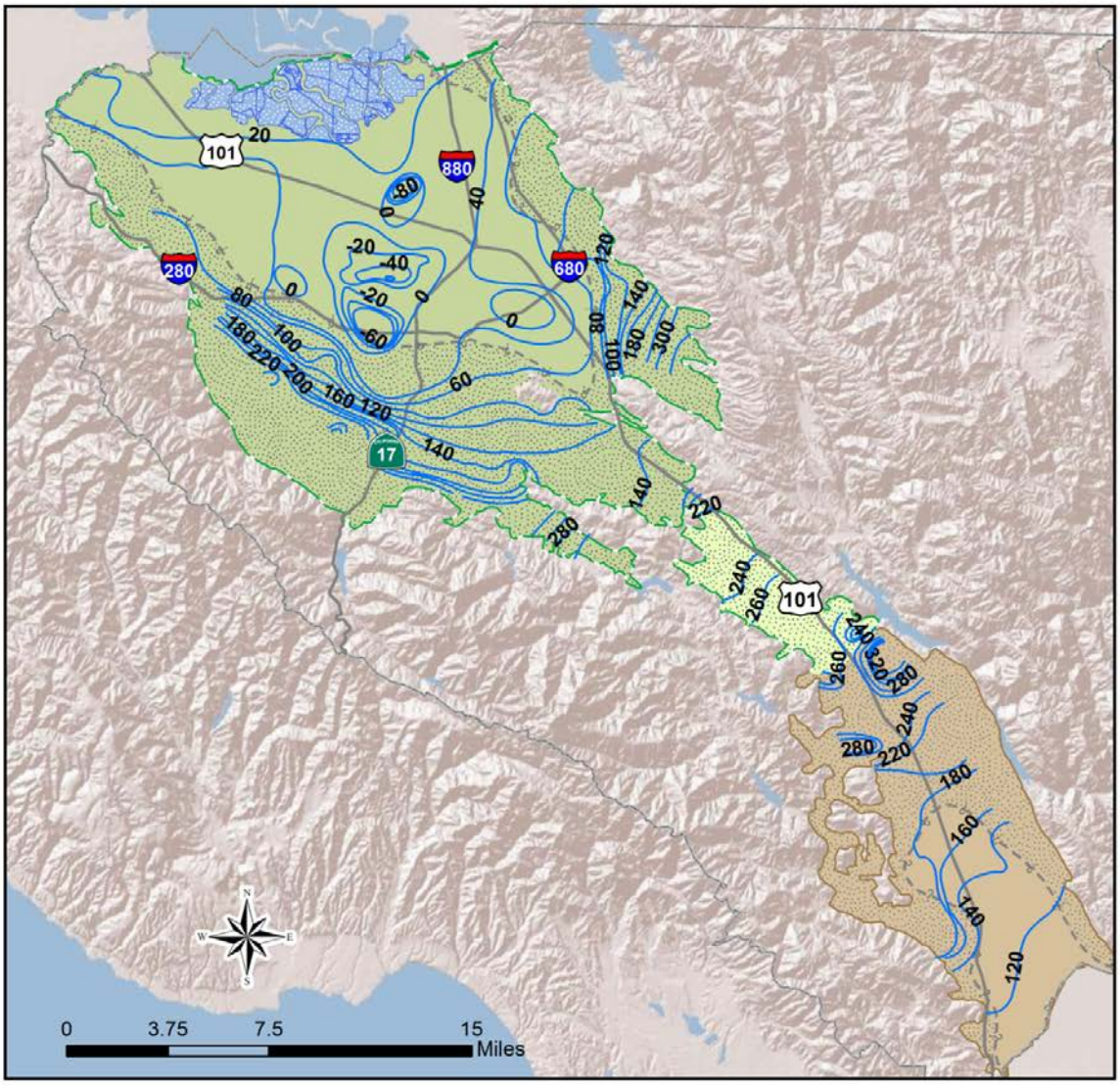
Figure 13 Spring 2014 Groundwater Elevation Contours



Groundwater Elevation Contour (feet above mean sea level)
Salt Ponds
Santa Clara County
Approximate Extent of Confined Area
Santa Clara Subbasin (DWR Basin 2-9.02)
Llagas Subbasin (DWR Basin 3-3.01)
Santa Clara Plain Confined Area
Santa Clara Plain Recharge Area
Coyote Valley Recharge Area
Llagas Confined Area
Llagas Recharge Area

Santa Clara Valley Water District

Figure 14 Fall 2014 Groundwater Elevation Contours



Groundwater Elevation Contour (feet above mean sea level)
Salt Ponds
Santa Clara County
Approximate Extent of Confined Area
Santa Clara Subbasin (DWR Basin 2-9.02)
Llagas Subbasin (DWR Basin 3-3.01)
Santa Clara Plain Confined Area
Santa Clara Plain Recharge Area
Coyote Valley Recharge Area
Llagas Confined Area
Llagas Recharge Area

Santa Clara Valley Water District

Table 6 Estimated End of Year Groundwater Storage (AF)

Groundwater Subbasin/Area	GWMP Outcome Measure	End of Year 2013	End of Year 2014	Change in Storage
Santa Clara Subbasin Santa Clara Plain	278,000	301,400	235,700	-65,700
Santa Clara Subbasin Coyote Valley	5,000	10,300	5,400	-4,900
Llagas Subbasin	17,000	26,600	16,100	-10,500
Total	**300,000**	**338,300**	**257,200**	**-81,100**

Groundwater Storage Outcome Measures

OM 2.1.1.a.
Greater than 278,000 AF of projected end of year groundwater storage in the Santa Clara Plain.

OM 2.1.1.b
Greater than 5,000 AF of projected end of year groundwater storage in the Coyote Valley.

OM 2.1.1.c.
Greater than 17,000 AF of projected end of year groundwater storage in the Llagas Subbasin.

The outcome measures for the Santa Clara Plain and Llagas Subbasin were not met in 2014, with an estimated end of year storage of 235,700 AF and 16,100 AF, respectively. The outcome measure for Coyote Valley was met for 2014, with estimated end of year storage of 5,400 AF. Based on the significant decline from 2013 and ongoing drought conditions, it is likely that the storage targets for all three groundwater areas will not be met in 2015.

4. LAND SUBSIDENCE

In 2014, the District measured subsidence at 143 benchmarks and two extensometers. Water levels at ten subsidence index wells were also monitored and compared to thresholds established to minimize the risk of permanent land subsidence. In 2014, these thresholds were met, except for one well which had water levels below the threshold between July and October. Water levels at two wells were within 15 feet of the thresholds, indicating an increasing risk.

The Santa Clara Plain is vulnerable to land subsidence with about 13 feet of inelastic (permanent) land subsidence observed in San Jose between 1915 and 1969 due to groundwater overdraft. Significant inelastic subsidence was essentially halted by about 1970 through the District's expanded conjunctive management programs, which allowed artesian heads to recover. Since then, some amount of elastic subsidence occurs annually in response to seasonal pumping and recharge as shown by extensometer measurements, benchmark surveys, and Interferometric Synthetic Aperture Radar (InSAR)[7] data. To avoid resumption of permanent inelastic subsidence, the District has established subsidence thresholds at ten index wells in the Santa Clara Plain[8]. A tolerable rate of 0.01 feet per year of subsidence[9] was used to determine thresholds at these wells. These subsidence thresholds are the groundwater levels that must be maintained to ensure a low risk of land subsidence.

The District conducts ongoing monitoring of benchmarks on the land surface, extensometers, and groundwater levels at subsidence index wells to determine if land subsidence is occurring or is threatening to exceed established thresholds. Subsidence monitoring points are shown in Figure 15. Monitoring results from extensometers, benchmark surveys, and subsidence index wells indicate a low, but increasing, risk of subsidence as described further below.

4.1 Extensometer Monitoring

The District monitors two 1,000-foot deep extensometers that measure vertical ground motion relative to a central, isolated pipe set beneath the water bearing units. The extensometers are located in Sunnyvale near Moffett Field ("Sunny") and near downtown San Jose ("Martha"), and equipped with data loggers to provide hourly readings of aquifer compaction and water level. The District evaluates the average land subsidence measured during the last 11 years to determine if it meets the tolerable rate of land subsidence of 0.01 feet/year.

Figure 16 shows cumulative compaction measured at the extensometers for the period of record supplemented with nearby benchmark data. These figures indicate that land subsidence conditions have been relatively stable. The figures also show close correlations between the District's land subsidence model, which is used to forecast land subsidence, and actual measured data. The average subsidence rate over the last 11 years (2004 to 2014) is 0.008 feet/year, which is below the tolerable subsidence rate of 0.01 feet/year. The average for the previous period (2003 to 2013) was 0.003 feet/year. The increased average subsidence rate results from groundwater level declines due to ongoing drought conditions. Measured compaction is within the elastic range observed historically, but vigilant land subsidence monitoring and analysis is critical as the drought continues.

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[7] Schmidt, D.A. and Burgmann, R., Time-Dependent Land Uplift and Subsidence in the Santa Clara Valley, California from a Large Interferometric Synthetic Aperture Radar Data Set, Journal of Geophysical Research, Volume 108, No. B9, 2003.

[8] Geoscience Support Services Inc. for Santa Clara Valley Water District, Subsidence Thresholds in the North County Area of Santa Clara Valley, 1991.

[9] The tolerable subsidence rate of no more than 0.01 feet per year on average was endorsed by the District's Water Retailer Groundwater Subcommittee.

4.2 Benchmark Elevation Surveys

Periodic benchmark surveys of land surface elevation have been conducted in Santa Clara County since 1912[10]. The District's current benchmark leveling program consists of annual surveys along cross valley three level circuits in the Santa Clara Plain. In 2014, the District analyzed land surface elevation data from 143 benchmarks to evaluate the spatial variability of land subsidence. Regional benchmark data is consistent with extensometer data, indicating the average annual change of land surface over the last 11 years does not exceed the tolerable rate of subsidence. However, the rate has increased as compared to the previous period.

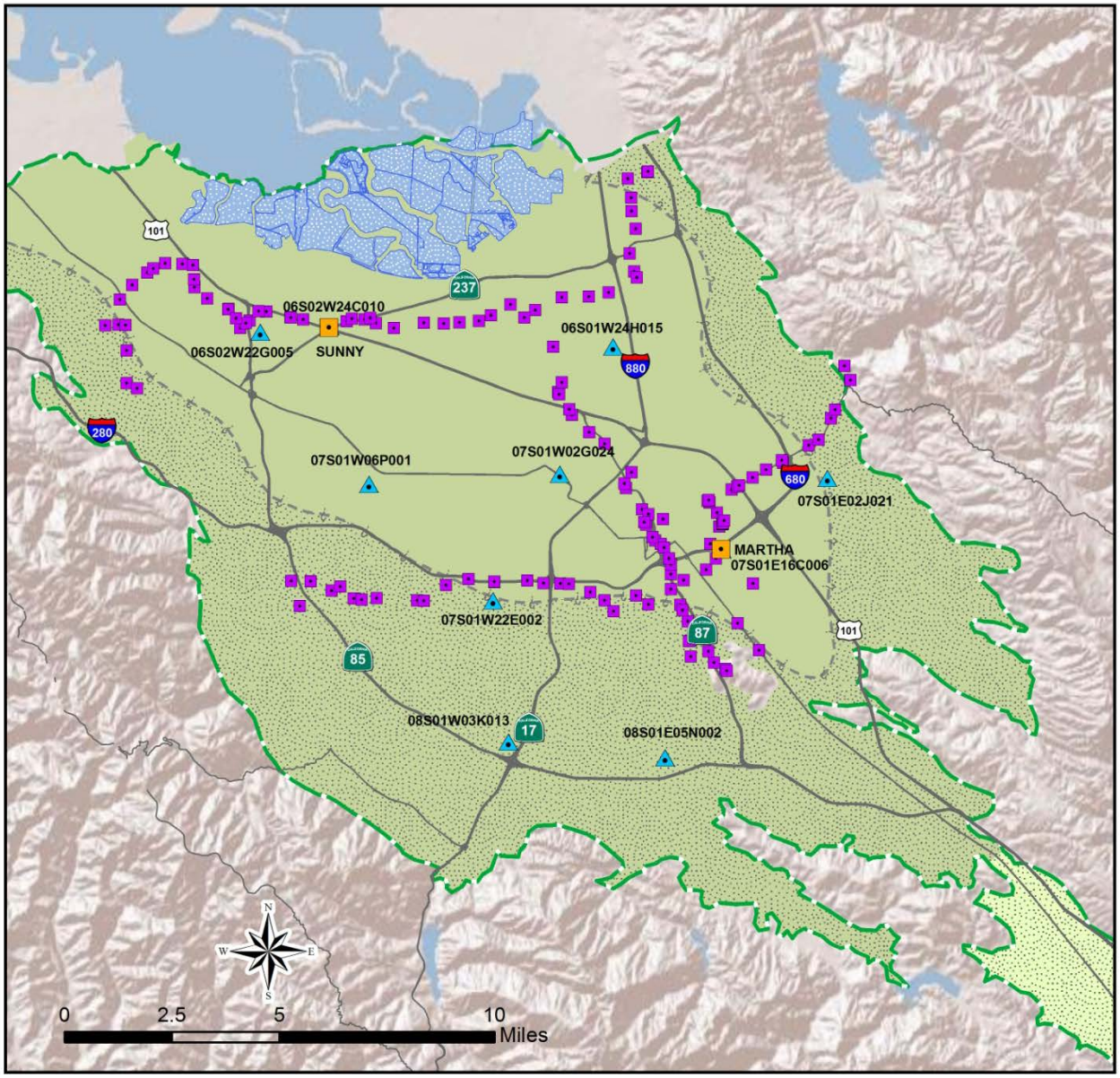
4.3 Subsidence Index Wells

Groundwater level measurements are an integral part of land subsidence monitoring because declining water levels due to long-term overdraft have been the driving force of subsidence in the Santa Clara Plain. The District measures water levels at ten subsidence index wells on a daily to monthly basis to ensure they remain above established thresholds. If water levels drop below subsidence thresholds for extended periods, permanent land subsidence may resume, resulting in an increased risk of flooding, salt water intrusion, and damage to infrastructure and utilities.

Figure 17 shows groundwater levels and subsidence thresholds at the ten subsidence index wells. The lowest historical water levels were generally observed in the 1960s and 1970s. Since then, groundwater levels have recovered, primarily due to the District's managed recharge and in-lieu recharge programs. Measured groundwater levels in 2014 were generally lower than 2013 due to continued drought conditions. Water levels at well 07S01W22E002 were below the threshold during the summer and fall of 2014 but recovered above the threshold during the winter. This is the first time that water levels in that well were below the threshold since 1989. Water levels in two other wells, 07S01W02G024 in Santa Clara and 07S01E16C006 in downtown San Jose, declined during the summer to within 15 feet of thresholds. Since these two wells are located in historically high subsidence areas, further decline of water levels could cause an increased risk of permanent land subsidence resuming in the area. Maintaining the water level above thresholds at three principal aquifer zone wells along San Francisco Bay (06S02W22G005, 06S02W24C010, and 06S01W24H015) is critical for keeping salt water from entering the Santa Clara Subbasin. Although 2014 water levels were above thresholds at all three wells, they have declining trends over the last several years due to the drought. The District will continue to frequently track data from the subsidence index wells to support water supply operations and planning.

[10] USGS, Land Subsidence in the Santa Clara Valley, California as of 1982, Professional Paper 497-F, 1988.

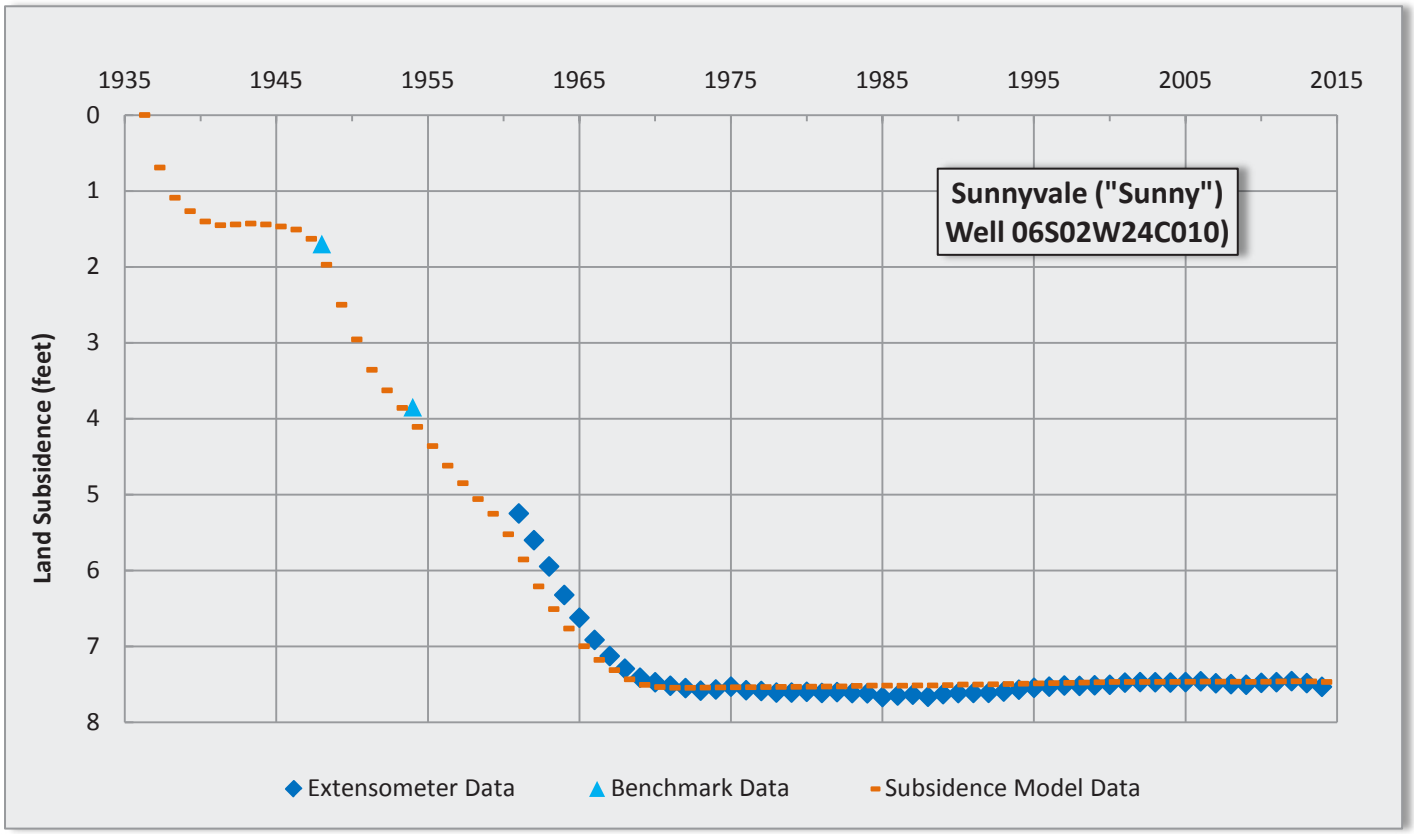
Figure 15 2014 Land Subsidence Monitoring



- 1000' Extensometer
- Benchmarks
- Subsidence Threshold Index Well
- Salt Ponds
- Approximate Extent of Confined Area
- Santa Clara Subbasin (DWR Basin 2-9.02)
- Santa Clara Plain Confined Area
- Santa Clara Plain Recharge Area
- Coyote Valley Recharge Area

Santa Clara Valley Water District

Figure 16 Cumulative Land Subsidence



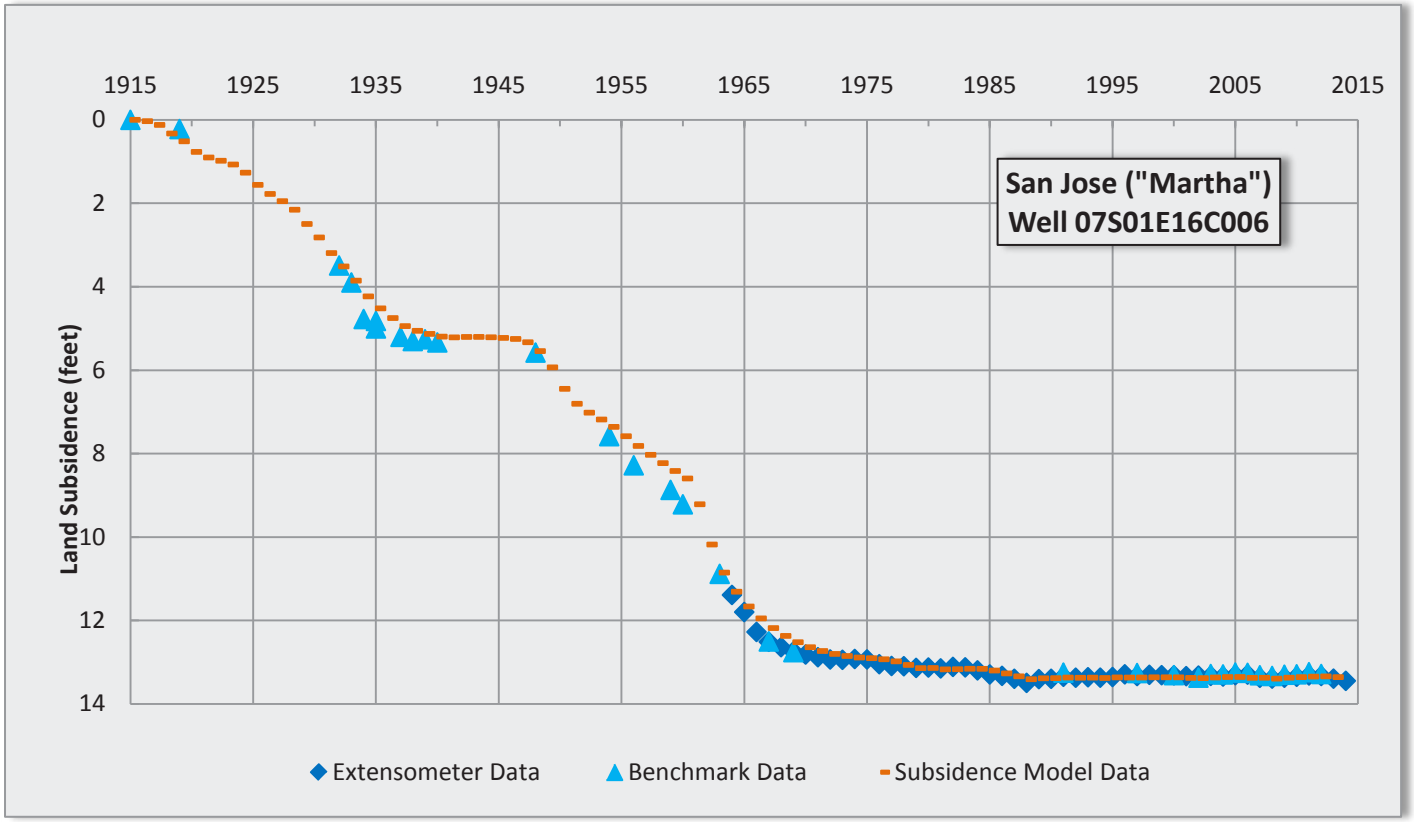


Figure 17 Groundwater Levels at Subsidence Index Wells (feet above mean sea level)

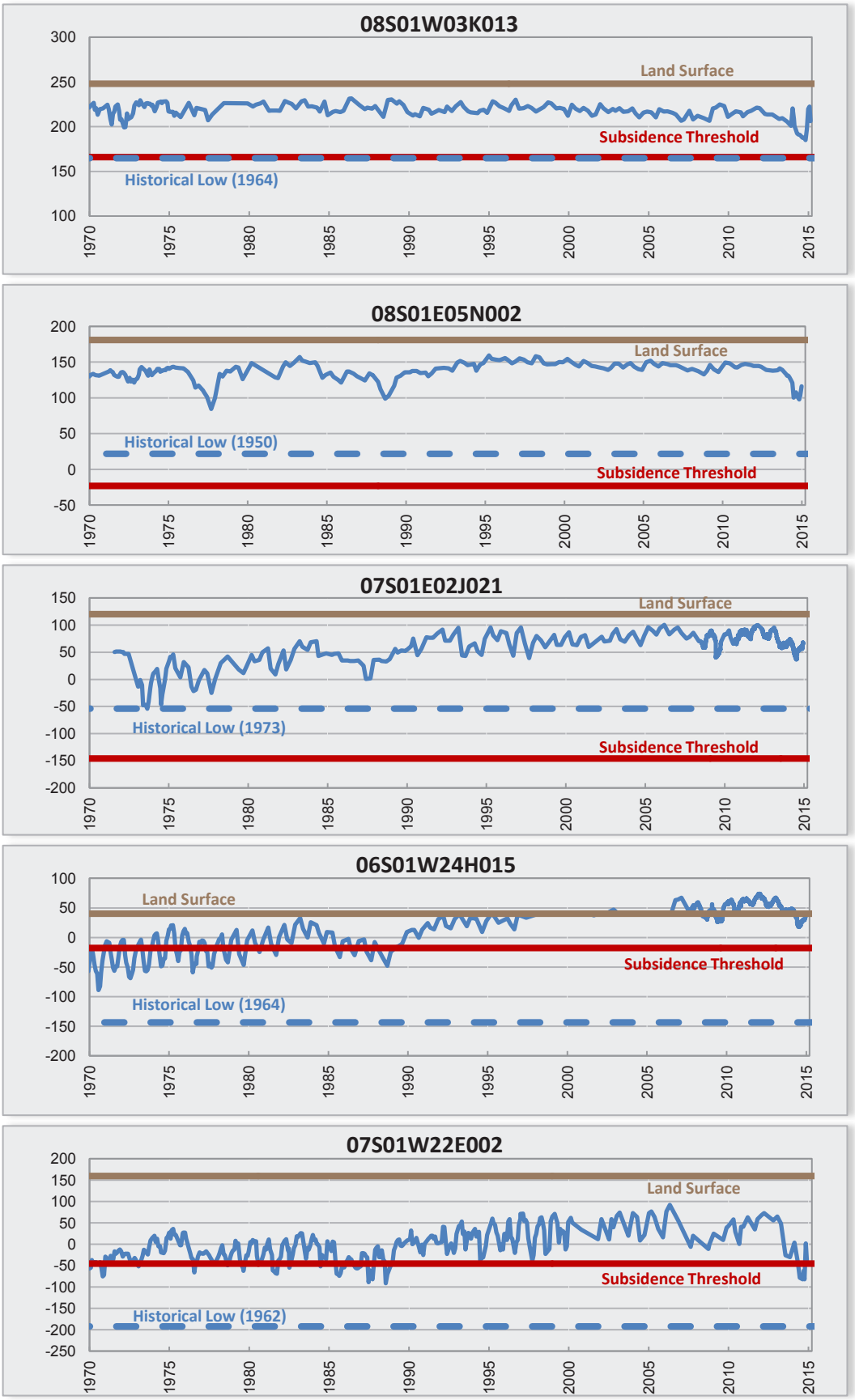
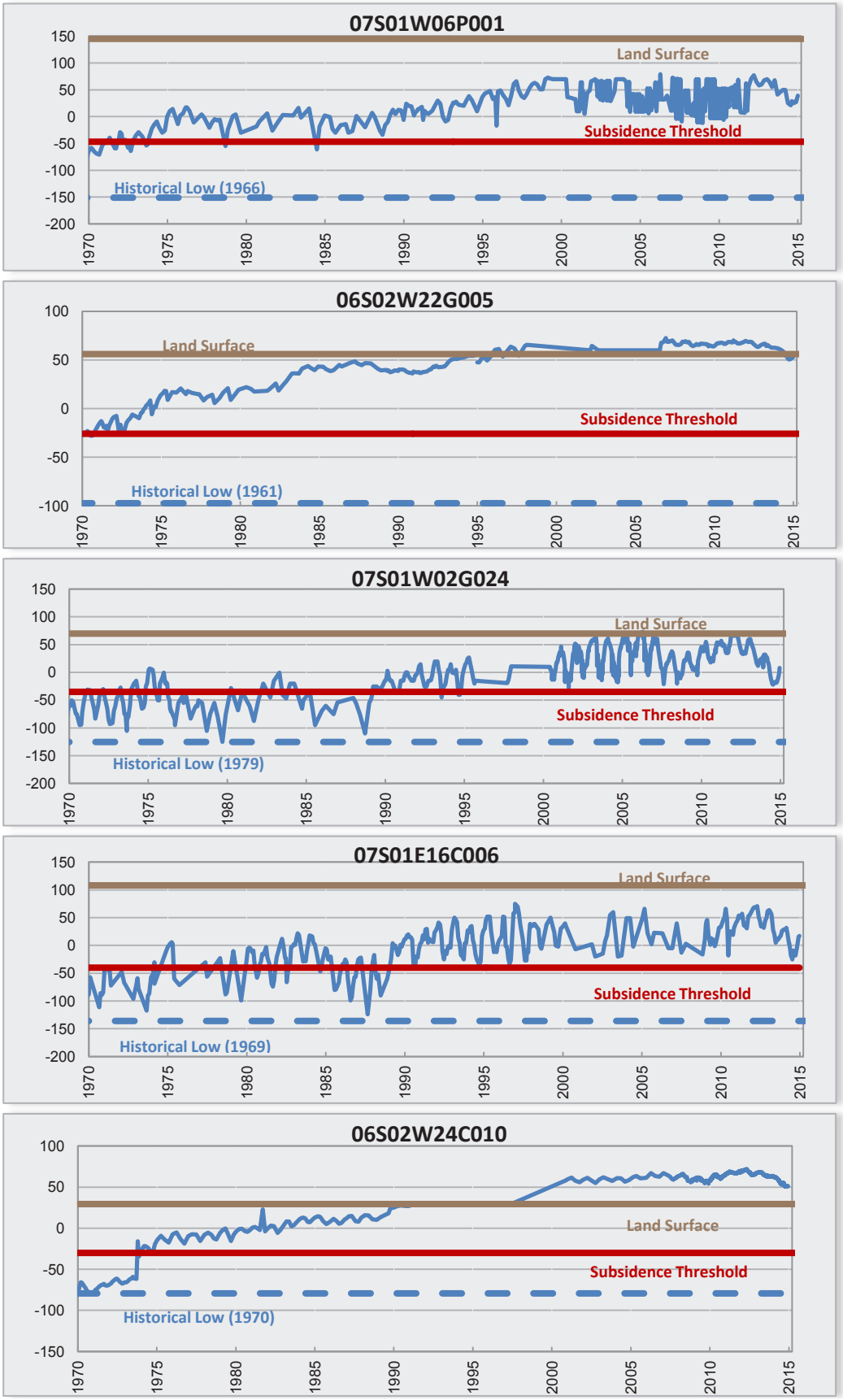


Figure 17 Groundwater Levels at Subsidence Index Wells (continued)



Land Subsidence Outcome Measure

OM 2.1.1.d.
100% of subsidence index wells with groundwater levels above subsidence thresholds.

The outcome measure is not met for calendar year 2014. Groundwater levels were above subsidence thresholds at nine index wells, but fell below the threshold at one well between July and October.

5. GROUNDWATER QUALITY

In 2014, the District tested groundwater quality at over 300 wells, including over 80 District monitoring locations, more than 200 domestic wells, and 17 wells near recycled water irrigation sites. The District also examined groundwater quality data from more than 250 public water supply wells and monitored recharge water quality at 8 locations.

Groundwater in the Santa Clara and Llagas Subbasins is generally of very high quality. The main exception is nitrate, which is elevated in about 25% of South County water supply wells (primarily domestic) due to historic and ongoing sources. To address nitrate loading, the District completed Salt and Nutrient Management Plans in 2014 in coordination with basin stakeholders. The District continues to offer free water testing and rebates for nitrate treatment systems for domestic well users to reduce consumer exposure.

Recharge water quality sampling was limited to a single event in February due to the ongoing drought and a significantly reduced managed recharge program in 2014. Results from the February sampling at the Guadalupe, Penitencia and Lower Llagas recharge systems indicate the recharge water quality is generally similar to or better than the underlying groundwater quality. The managed recharge systems sampled do not appear to be impacted by anthropogenic contaminants typically carried in runoff.

Groundwater monitoring near recycled water irrigation sites shows some increasing trends for salts, as well as low-level detections of disinfection byproducts and other constituents. The District will continue to track water quality changes and work with stakeholders to identify ways to minimize the risk of groundwater contamination.

5.1 Regional Groundwater Quality

The District sampled groundwater quality at 85 wells, including 60 monitoring wells and 25 domestic wells as part of the annual groundwater quality monitoring program (Figure 18)[11]. Each sample was analyzed for approximately 50 parameters including major and minor ions, nutrients, and trace metals. This report also incorporates data from 20 wells with known construction sampled through the District's domestic well sampling program. The District also evaluated data from 255 public water supply wells sampled by water retailers and reported to the State Water Resources Control Board Division of Drinking Water (DDW)[12].

To evaluate regional water quality conditions, the District evaluated parameter median and range for each subbasin and aquifer zone[13] (Appendix B). Results indicate groundwater in the Santa Clara and Llagas Subbasins is generally of high quality. Water quality indicators, ions, and trace elements were within the normal range expected in groundwater, with the exception of nitrate. Elevated nitrate is primarily an issue in South County due to historic and ongoing sources including synthetic fertilizer, septic systems, and animal enclosures. A few individual volatile organic compounds (VOCs) were detected in various wells, however none were present at concentrations above drinking water standards.

[11] The District also collected limited water quality data at 216 domestic wells in 2014 as part of the Domestic Well Testing Program. Data from the 20 domestic wells with available well construction information are summarized in this section. The results for all domestic wells are summarized in Section 5.3.
[12] Formerly the California Department of Public Health (CDPH).
[13] Public water supply wells were assumed to represent the principal aquifer if no construction information was available as these are typically deep wells.

Recent sample medians for nitrate and Total Dissolved Solids (TDS) are presented in Table 7. There is no statistically significant change for nitrate or TDS between 2013 and 2014 for all areas and aquifer zones per the Mann-Whitney Test using a 95% confidence level. Fluctuations in sample medians are expected due to variation of wells tested, recharge, pumping, and rainfall.

Table 7 Median Nitrate and TDS by Subbasin and Aquifer Zone (mg/L)

Parameter	Santa Clara Subbasin						Llagas Subbasin			
	Santa Clara Plain Shallow Aquifer		Santa Clara Plain Principal Aquifer		Coyote Valley		Shallow Aquifer		Principal Aquifer	
	2014	2013	2014	2013	2014	2013	2014	2013	2014	2013
Nitrate (as NO_3)	6.4	4.8	13	14	15.2	17.6	49.2	30.7	20.5	22
TDS	542[4]	491	410	410	370	330	434	409	382	360

1) The shallow and principal aquifer zones are represented by wells primarily drawing water from depths less than and greater than 150 feet, respectively.
2) Nitrate has a health-based MCL of 45 mg/L. TDS has an aesthetic-based MCL, which ranges from 500 to 1,000 mg/L (recommended and upper limit, respectively).
3) Table includes information for monitoring wells, public water supply wells, and domestic wells for which construction information is available. The set of wells sampled each year varies.
4) This median excludes wells within the region influenced by salt water interaction.

Comparison to Drinking Water Standards

With the exception of nitrate, 99% of water supply wells tested (including public water supply wells and domestic wells) met all health-based drinking water standards; this drops to 80% if nitrate is included. The only parameters detected above the MCL in North County water supply wells were aluminum and nickel in one well (Figure 19). Follow-up testing at the well did not confirm the presence of nickel; aluminum was present, but was below the MCL. Nearly 25% of South County water supply wells tested contained nitrate above the MCL of 45 milligrams per liter (mg/L). Most of these detections were from private domestic wells that are not regulated by the state. Public water systems must comply with drinking water standards, which may require treatment or blending prior to customer delivery.

While not used as a source of drinking water, some monitoring wells sampled tap the principal aquifer zone. Of these deep monitoring wells, only one had a detection of any constituent above health-based standards (aluminum). However, the validity of this result is questionable due to the sample having high turbidity. Some shallow aquifer zone monitoring wells were affected by nitrate (three wells) and arsenic (one well).

Comparison to Agricultural Objectives

South County groundwater quality was evaluated against agricultural water quality objectives from the applicable Regional Water Quality Control Board Basin Plans[14] to assess its suitability for agricultural uses. Because the District has limited access to agricultural wells, water supply well data were used in this evaluation. 98 percent of South County

[14] Groundwater in the Coyote Valley is compared to the limits in Table 3-6 of the San Francisco Bay Basin Water Quality Control Plan (December 2011). Groundwater in the Llagas Subbasin is compared to the upper range of the "increasing problems" range in Table 3-3 and Table 3-4 (irrigation supply) of the Water Quality Control Plan for the Central Coast Basin (June 2011).

water supply wells met Basin Plan agricultural objectives. In Coyote Valley, all wells met the objectives except one well each for nitrate and electrical conductivity. In the Llagas Subbasin, four wells did not meet the nitrate objective.

5.2 Groundwater Quality Trends

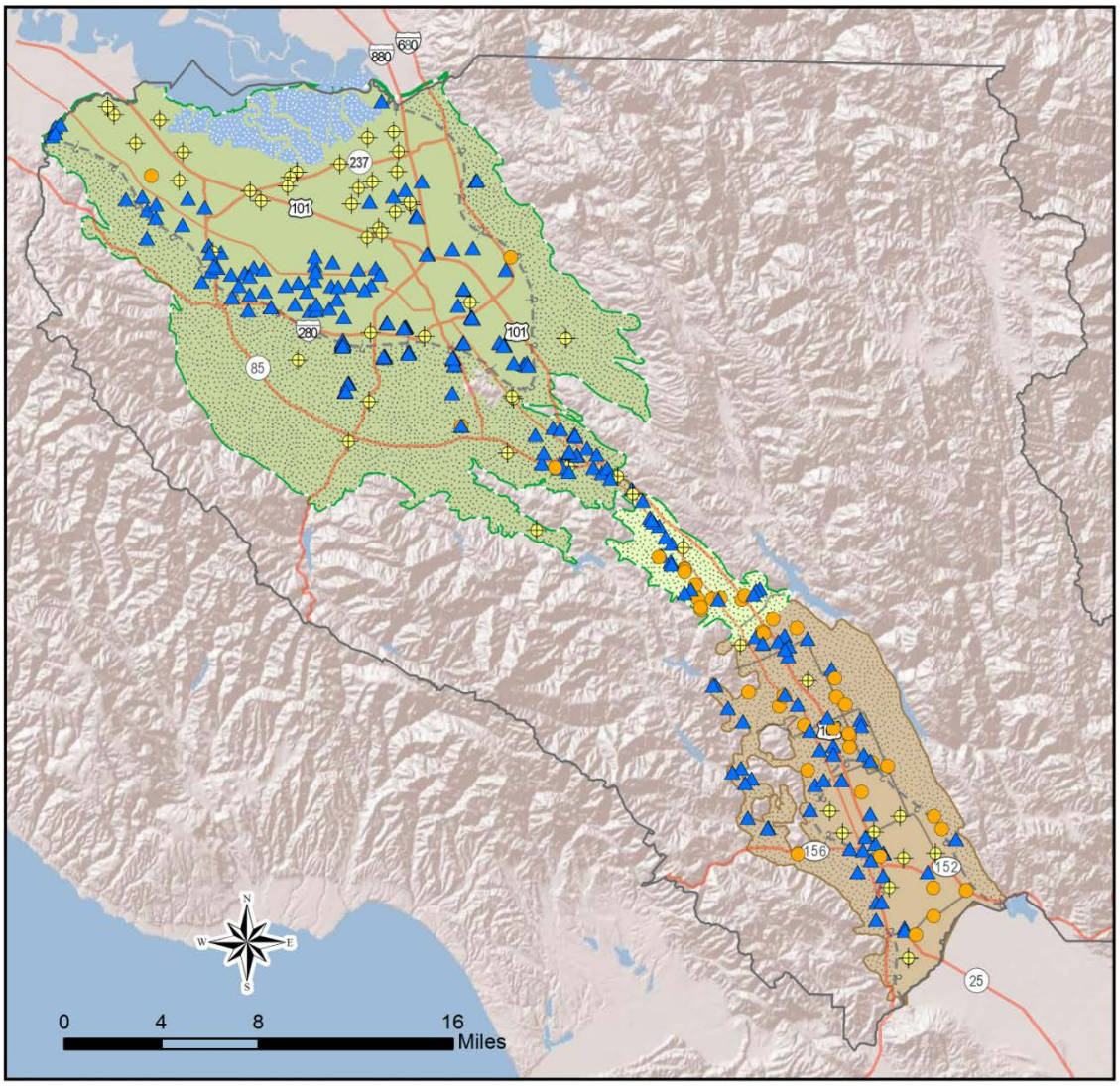
To assess changes in water quality over time, the District evaluated statistical trends for chloride, nitrate, and TDS by groundwater management area and aquifer zone. Trend was evaluated for all wells (including water supply and monitoring wells) with at least 5 results over the last fifteen years (2000 through 2014). The results are shown in Figures 20 through 22 and summarized in Table 8, which indicates the majority of wells show a stable or decreasing trend.

In general, chloride trends are stable or increasing in the Llagas Subbasin, stable in Coyote Valley, and mixed in the Santa Clara Plain. Nitrate is generally stable or decreasing throughout the county, and a cluster of wells with decreasing trends is observed in the southern portion of the Santa Clara Plain near the Coyote Valley (Figure 21). This may be the result of dilution from the managed recharge of water with low nitrate content through Coyote Creek. Though less well-defined, another cluster of wells with an upward nitrate trend is observed in the downtown area of San Jose. Only a small percentage of wells had increasing trend for TDS.

Table 8 Chloride, Nitrate, and TDS Trends (2000 – 2014)

Groundwater Management Area	Parameter	Number of Wells Evaluated	Percent Wells with Stable or Decreasing Trend	Number of Wells with Increasing Trend
Santa Clara Plain Shallow Aquifer	Chloride	29	83%	5
	Nitrate (as NO_3)	22	95%	1
	TDS	21	90%	2
Santa Clara Plain Principal Aquifer	Chloride	139	91%	13
	Nitrate (as NO_3)	251	91%	22
	TDS	135	97%	4
Coyote Valley	Chloride	15	100%	0
	Nitrate (as NO_3)	28	89%	3
	TDS	17	88%	2
Llagas Subbasin Shallow Aquifer	Chloride	20	60%	8
	Nitrate (as NO_3)	25	72%	7
	TDS	21	81%	4
Llagas Subbasin Principal Aquifer	Chloride	38	87%	5
	Nitrate (as NO_3)	84	96%	3
	TDS	38	97%	1
All Groundwater Management Areas	Chloride	241	87%	31
	Nitrate (as NO_3)	410	91%	36
	TDS	232	94%	13

Figure 18 2014 Groundwater Quality Monitoring

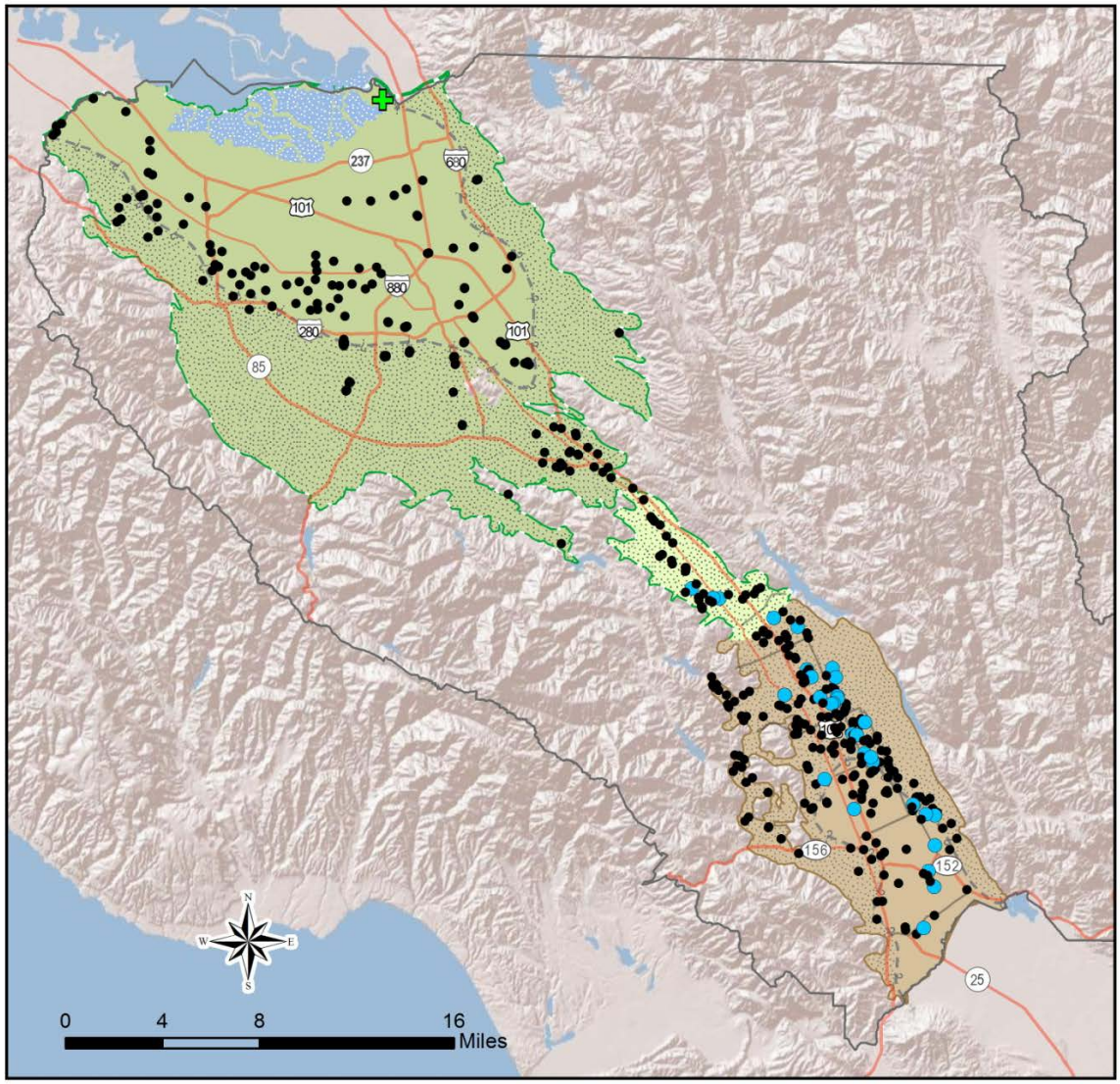


Well Type

- (Sampled by Public Water Retailers)
- Domestic Well
- Monitoring Well
- Santa Clara County
- Salt Ponds
- Approximate Extent of Confined Area
- Santa Clara Plain Confined Area
- Santa Clara Plain Recharge Area
- Coyote Valley Recharge Area
- Llagas Confined Area
- Llagas Recharge Area
- Santa Clara Subbasin (DWR Basin 2-9.02)
- Llagas Subbasin (DWR Basin 3-3.01)

Santa Clara Valley Water District

Figure 19 2014 Water Supply Well Results with Regard to Primary Drinking Water Standards

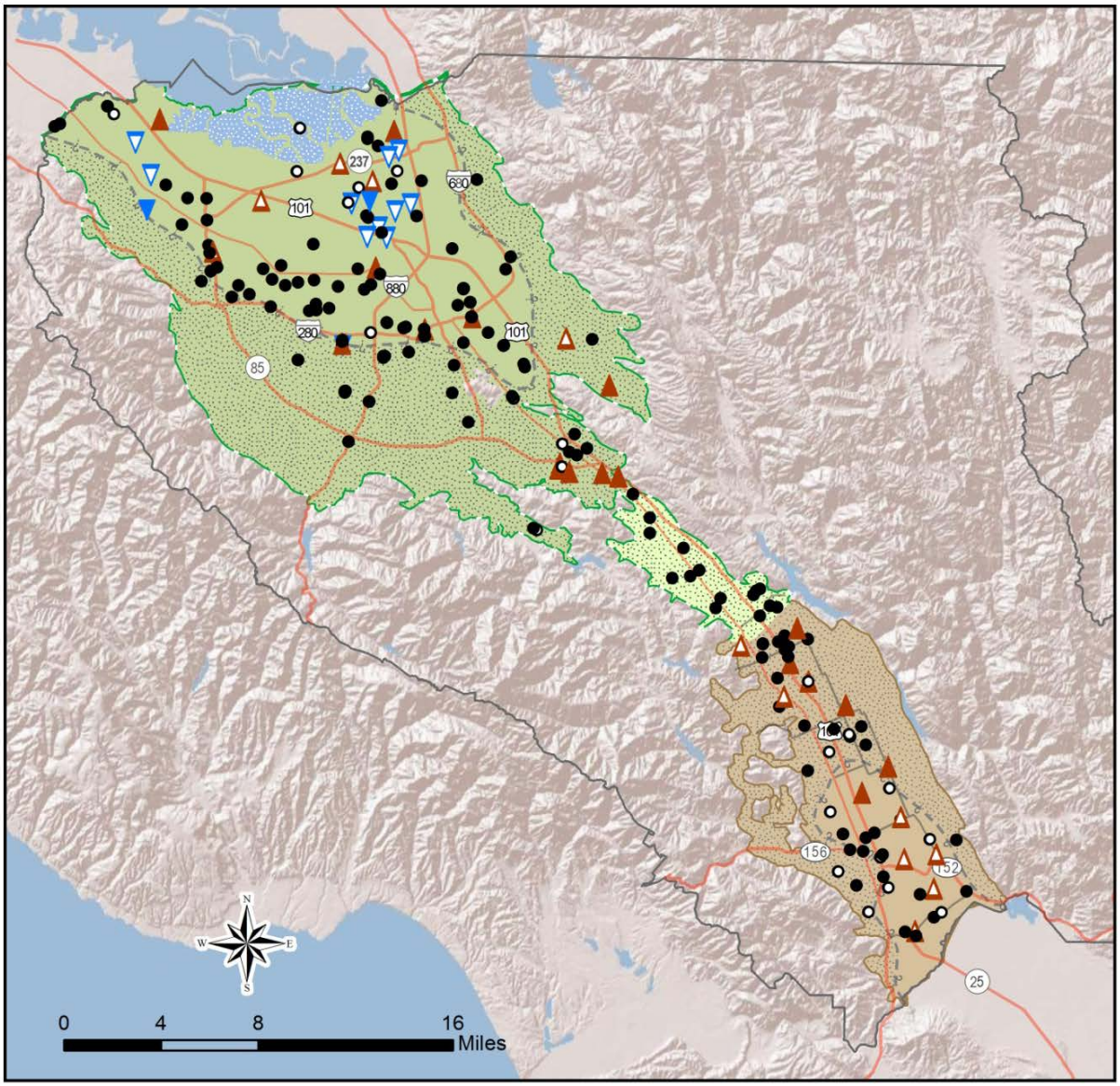


Legend

- Nitrate
- Aluminum, Nickel
- Meets all standards
- Santa Clara County
- Salt Ponds
- Approximate Extent of Confined Area
- Santa Clara Plain Confined Area
- Santa Clara Plain Recharge Area
- Coyote Valley Recharge Area
- Llagas Confined Area
- Llagas Recharge Area
- Santa Clara Subbasin (DWR Basin 2-9.02)
- Llagas Subbasin (DWR Basin 3-3.01)

Santa Clara Valley Water District

Figure 20 Chloride Trends (2000 - 2014)

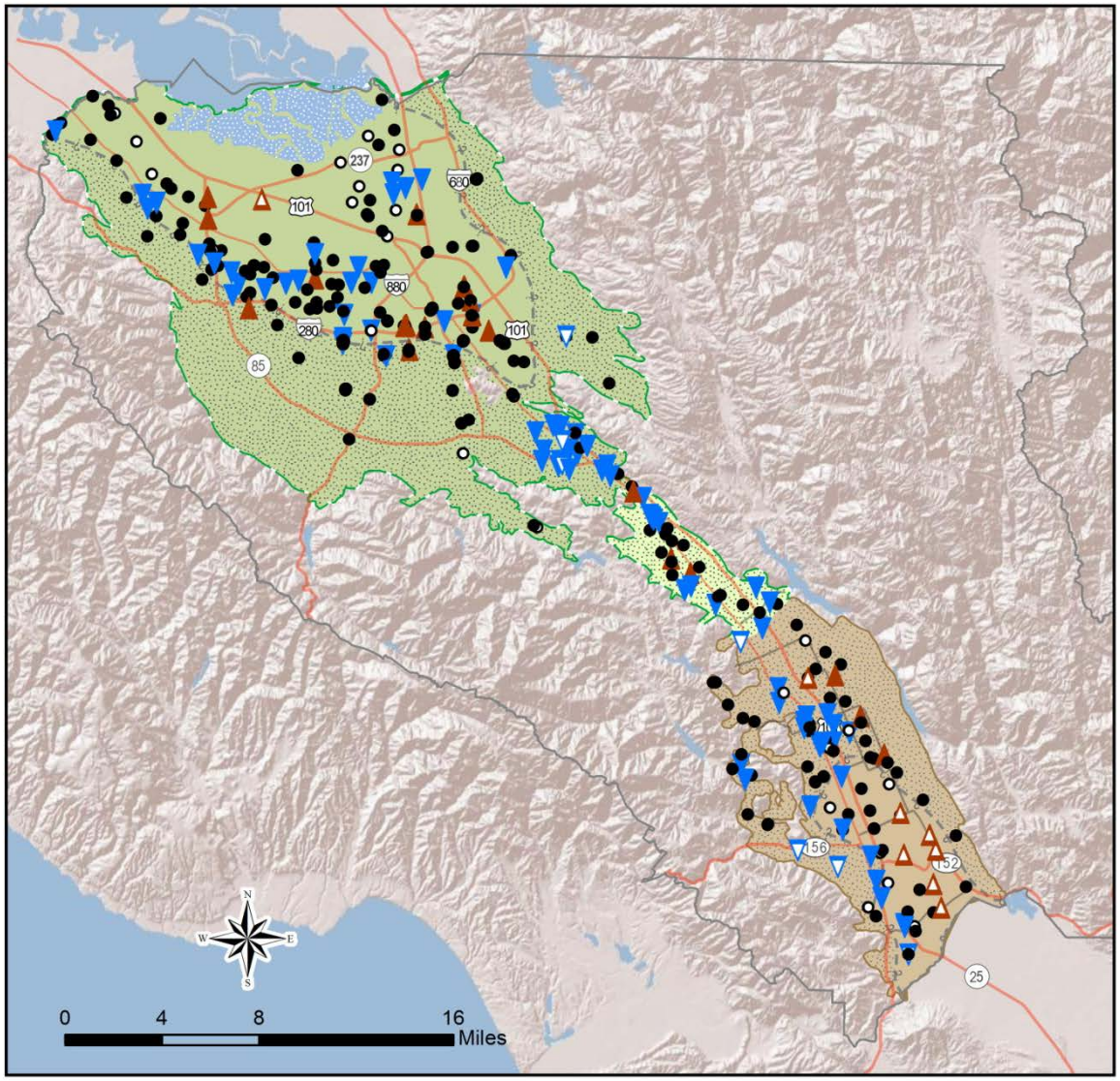


Trends

- Stable (Shallow Aquifer)
- Stable (Principal Aquifer)
- Increasing (Shallow Aquifer)
- Increasing (Principal Aquifer)
- Decreasing (Principal Aquifer)
- Decreasing(Shallow Aquifer)
- Salt Ponds
- Santa Clara County
- Approximate Extent of Confined Area
- Santa Clara Plain Confined Area
- Santa Clara Plain Recharge Area
- Coyote Valley Recharge Area
- Llagas Confined Area
- Llagas Recharge Area
- Santa Clara Subbasin (DWR Basin 2-9.02)
- Llagas Subbasin (DWR Basin 3-3.01)

Santa Clara Valley Water District

Figure 21 Nitrate Trends (2000 - 2014)

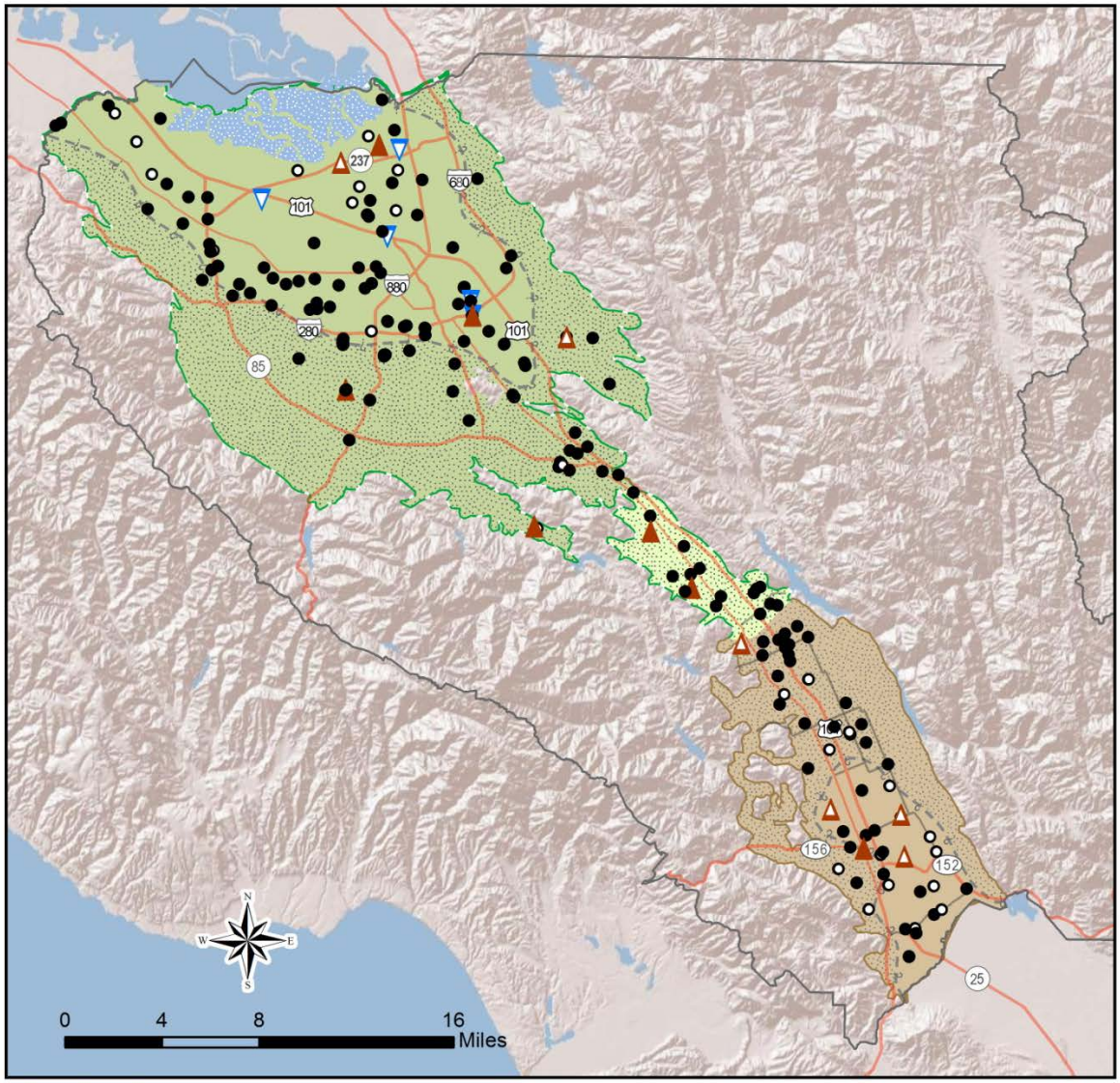


Trends

- Stable (Shallow Aquifer)
- Stable (Principal Aquifer)
- Increasing (Shallow quifer)
- Increasing (Principal Aquifer)
- Decreasing (Shallow Aquifer)
- Decreasing (Principal Aquifer)
- Santa Clara County
- Salt Ponds
- Approximate Extent of Confined Area
- Santa Clara Plain Confined Area
- Santa Clara Plain Recharge Area
- Coyote Valley Recharge Area
- Llagas Confined Area
- Llagas Recharge Area
- Santa Clara Subbasin (DWR Basin 2-9.02)
- Llagas Subbasin (DWR Basin 3-3.01)

Santa Clara Valley Water District

Figure 22 Total Dissolved Solids (TDS) Trends (2000 - 2014)



Trends

- Stable (Shallow Aquifer)
- Stable (Principal Aquifer)
- Increasing (Shallow Aquifer)
- Increasing (Principal Aquifer)
- Decreasing (Principal Aquifer)
- Decreasing (Shallow Aquifer)
- Santa Clara County
- Salt Ponds
- Approximate Extent of Confined Area
- Santa Clara Plain Confined Area
- Santa Clara Plain Recharge Area
- Coyote Valley Recharge Area
- Llagas Confined Area
- Llagas Recharge Area
- Santa Clara Subbasin (DWR Basin 2-9.02)
- Llagas Subbasin (DWR Basin 3-3.01)

Santa Clara Valley Water District

Groundwater and Salt Water Interaction

Salt water intrusion of shallow aquifers was observed historically near South San Francisco Bay and along the Guadalupe River and Coyote Creek in the northern portion of the Santa Clara Plain. As previously discussed, the District has implemented managed recharge and in-lieu recharge programs to minimize the risk of groundwater overdraft, land subsidence, and salt water intrusion.

Groundwater and salt water interaction in the shallow aquifer zone adjacent to southern San Francisco Bay was evaluated based on the chloride content of samples from shallow monitoring wells not used for domestic or municipal supply. The District uses a chloride concentration of 100 mg/L to indicate influence from salt water. This is a conservative indicator as the aesthetic-based MCL for chloride is 250 mg/L.

As shown on Figure 23, wells having chloride over 100 mg/L are confined to a somewhat narrow band adjacent to the former salt evaporation ponds except in the areas adjacent to Guadalupe River and Coyote Creek. In these areas, a larger portion of the shallow aquifer is affected. A significant increase in chloride content is observed near the levee system that defines the former salt evaporation ponds. The majority of shallow wells in this area have downward trends for chloride, demonstrating that salt water intrusion front appears to be stable or retreating.

Historically, only a small portion of the principal aquifer zone was observed to be intruded by salt water, and the intrusion noted was mild. The District does not currently monitor principal zone wells in this region. Though salt water intrusion has been halted due to the District's managed and in-lieu recharge programs, the influence of historical salt water intrusion can still be observed in elevated chloride concentrations in the Baylands area.

5.3 Domestic Well Water Quality

In addition to regional groundwater monitoring, the District offers basic water quality testing to eligible domestic well owners within the District's groundwater charge zones. In 2014, the District tested 36 domestic wells in North County and 180 wells in South County. Basic water quality parameters include nitrate, bacteria, electrical conductivity, and hardness.

Domestic well data helps improve the District's understanding of the occurrence of common contaminants and provides important information that helps well owners better protect their health. Although private domestic wells are not regulated by the state, the comparison to state drinking water standards provides context for results. Table 9 summarizes the results for each charge zone, including the median and percent of wells above drinking water standards.

Nitrate was detected above the health-based MCL at 6% and 31% of North County and South County domestic wells tested, respectively. The median nitrate concentration in domestic wells in North County was 13.3 mg/L, and in South County it was 30.2 mg/L. The 2014 regional median values for the Santa Clara Plain, Coyote Valley, and Llagas Subbasin, were 13, 15.2, and 20.5 mg/L, respectively. The higher median in some domestic wells may be due to well construction differences or the fact that public water systems have more flexibility in blending or switching sources when concentrations approach the MCL.

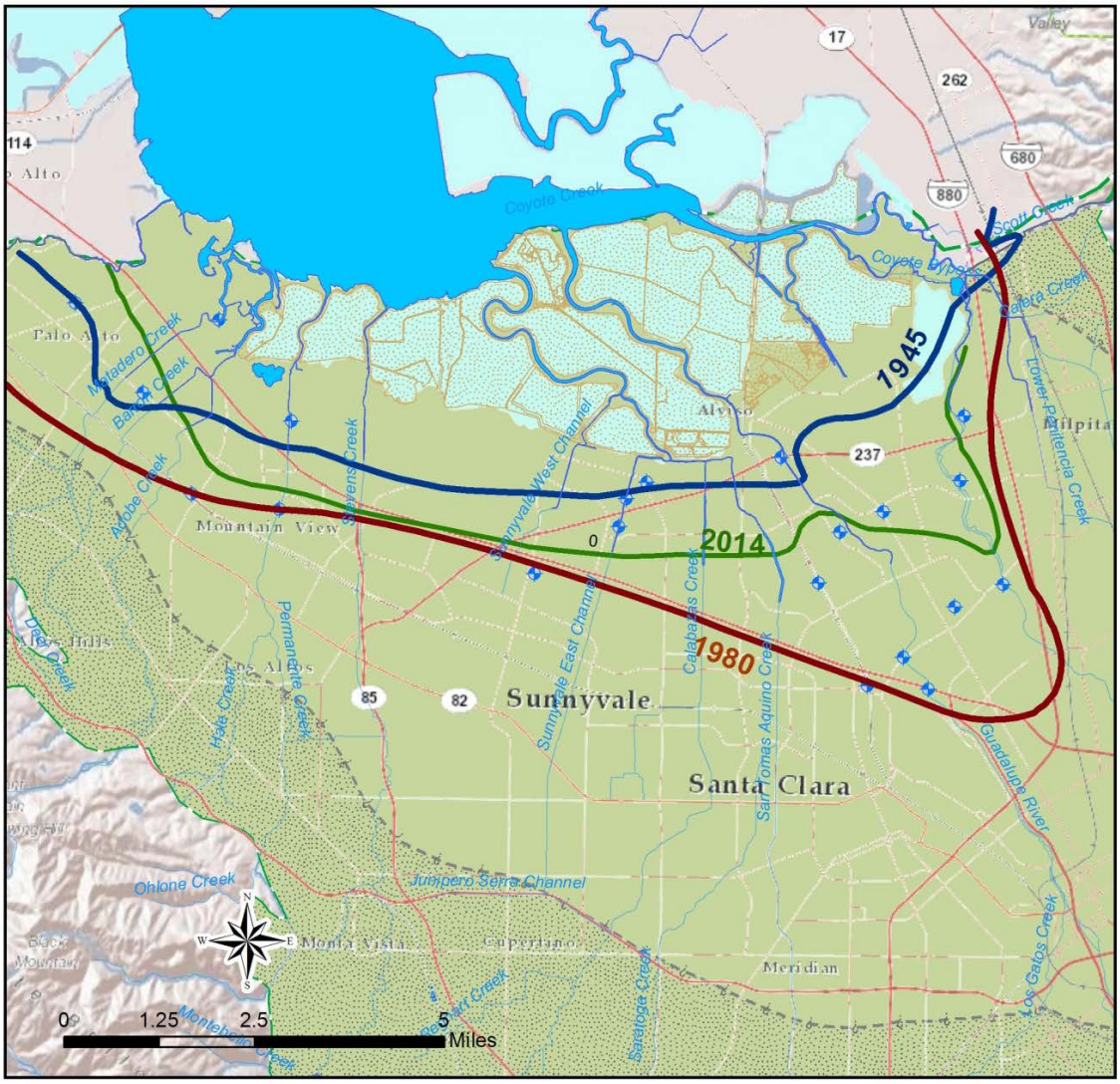
Countywide, total coliform bacteria were detected in about 30% of the domestic wells tested. Coliform bacteria are naturally present in humans, animals, and the environment and do not normally cause illness, but they should not be

present in drinking water. Escherichia coli (E. coli), a type of bacteria indicative of fecal contamination, were detected in about 1% of the domestic wells tested countywide. Total coliform and E. coli detections appear randomly distributed.

District staff informed the well owner promptly and provided relevant information if any contaminants were detected above drinking water standards or if bacteria were present. All participants were mailed a copy of the certified laboratory report. Based on survey results, participants were very satisfied with the testing program, with nearly all survey questions receiving overwhelmingly positive results. The majority of respondents would like testing to continue to be offered annually.

The continued presence of nitrate above the MCL in many domestic wells highlights the need for continued efforts to reduce well owners' exposure to nitrate. The District began implementation of a multi-year rebate program for nitrate treatment systems in the fall of 2013. This effort complements outreach and other efforts to reduce nitrate loading in coordination with the Central Coast Water Board and other basin stakeholders.

Figure 23 Groundwater and Salt Water Interaction



Saltwater Intrusion Monitoring

- 1945 Chloride Contour (100 mg/L)
- 1980 Chloride Contour (100 mg/L)
- 2014 Chloride Contour (100 mg/L)
- Salt Water Intrusion Monitoring Well
- Santa Clara County
- Approximate Extent of Confined Area
- Santa Clara Plain Confined Area
- Santa Clara Plain Recharge Area
- Santa Clara Subbasin (DWR Basin 2-9.02)

Santa Clara Valley Water District

Table 9 2014 Domestic Well Testing Results

Parameter and Units	MCL[1]	Zone W-2 North County		Zone W-5 South County	
		Median	Wells above MCL[1] (%)	Median	Wells above MCL[1] (%)
Nitrate (mg/L)	45 (P)	13.3	6%	30.2	31%
Fluoride (mg/L)	2 (P)	0.16	0%	0.15	0%
Electrical Conductivity (uS/cm)	900 (S)	724	41%	648	16%
Sulfate (mg/L)	250 (S)	44.7	0%	37.1	0%
Hardness (mg/L as CaCO3)	--	282	--	277	--
		Wells with Bacteria Present (No.)	Wells with Bacteria Present (%)	Wells with Bacteria Present (No.)	Wells with Bacteria Present (%)
Total Coliform Bacteria	--[2]	10	56%	54	27%
E. Coli Bacteria	--[2]	1	3%	1	<1%

Notes:

1) Maximum contaminant levels are established by the DDW for public water systems. (P) indicates the parameter has a health-based primary MCL and (S) indicates a secondary, aesthetic-based MCL. Hardness does not have a primary or secondary MCL but water with hardness above 180 mg/L is classified as very hard. Water quality in domestic wells is not regulated by the state.
2) Bacteria are measured as present or absent. Public water systems are required to ensure that fewer than 5% of samples have total coliform present and that no samples have E. Coli present.

5.4 Recharge Water Quality

The District monitors surface water quality at selected in-stream and off-stream recharge facilities to characterize recharge water quality and assess how groundwater quality may be influenced by managed recharge. Monitoring is conducted in accordance with the District's Recharge Water Quality Monitoring Plan,[7] which provides for wet and dry season sampling in each recharge system every three years.

Due to ongoing drought conditions, managed recharge releases to creeks and ponds were reduced to a minimum and many recharge facilities were dry in 2014. Therefore, the District was only able to monitor 8 facilities in the Guadalupe, Penitencia and Lower Llagas recharge systems in February (Table 10). The samples collected were analyzed for major and minor ions, trace elements, and select organic compounds. Testing of organic compounds was conducted at recharge facilities located near potentially contaminating sources (e.g., industrial and automotive chemical sources or herbicide/pesticide application areas) to evaluate potential impacts from runoff. The source of managed recharge water at each facility varies, and may consist of imported water, local water, or a blend of the two.

[7] Santa Clara Valley Water District, Recharge Water Quality Monitoring Plan, September 2012.

Table 10 2014 Recharge Water Quality Sampling Locations

Recharge System	Facilities Sampled
Guadalupe	Los Capitancillos Pond, Alamitos Creek and Guadalupe Pond
Penitencia	Overfelt Pond and Penitencia Pond
Lower Llagas	Llagas Creek, Uvas Creek (2 locations)

Although managed recharge water is not suitable for direct consumption before treatment or infiltration, comparing it to drinking water standards provides context for results. No parameters were detected above health-based drinking water standards in any of the recharge water samples. No volatile or semi-volatile organic compounds (including pesticides) were detected in any samples.

Key water quality indicators for salinity, non-point source pollution, and trace metals are compared against background groundwater concentrations. Recharge water quality is generally good, with most indicators similar to or better than receiving water throughout the year (Table 11). Managed recharge water for all three systems has relatively low levels of nitrate, which helps dilute nitrate in groundwater.

Table 11 Key Water Quality Indicators for Recharge Systems Sampled in 2014

Parameter	Guadalupe System	Penitencia System	Lower Llagas System	MCL	SMCL	Typical Groundwater Concentration
TDS	340	357	248	-	500	410
Total Alkalinity (as $CaCO_3$)	141	85.5	148	-	-	220
Chloride	76	112.5	13	-	250	45
Sulfate	38.5	47.4	39.7	-	250	44
pH	8.22	7.95	7.76	-	6.5-8.5	7.4
Nitrate (as NO_3)	1.23	0.82	1.81	45	-	14
Aluminum	<20	<20	<20	1,000	200	21
Iron	<20	30.5	20.7	-	300	29.4

Notes:
1) Table shows the median value for all stations sampled within the recharge system.
2) All values shown are in milligrams per liter (mg/L) except for pH, which is shown in pH units.
3) Typical groundwater concentrations shown are the 2014 median values for the Santa Clara Plain principal aquifer zone.

5.5 Monitoring Near Recycled Water Irrigation Sites

The District partners with the four recycled water producers in the county[15] to expand recycled water use for non-potable purposes like large landscape irrigation, agriculture, and industry. Tertiary treated recycled water generally has higher concentrations of salts, nutrients, disinfection byproducts, and emerging contaminants than local groundwater or treated water[16]. Contaminants may be introduced to groundwater through landscape irrigation, and previous studies near recycled water irrigation sites have noted evidence of significant recycled water contribution to shallow wells[17].

In 2011, the District completed the Recycled Water Irrigation and Groundwater (RWIG) Study[18] which included a field study at a recycled water irrigation site. The study did not find significant changes in groundwater quality for most constituents after recycled water irrigation. However, several constituents were detected at low levels, including perfluorochemicals (PFCs) and N-Nitrosodimethylamine (NDMA, a disinfection byproduct). The study suggested that best management practices and/or changes in recycled water treatment may be warranted in sensitive groundwater areas.

The District and South Bay Water Recycling (SBWR) have worked to improve recycled water quality for irrigation and other uses. Since March 2014, recycled water provided by SBWR has been blended with advanced treated water from the District's Silicon Valley Advanced Water Purification Center (SVAWPC), which produces up to eight million gallons of water a day using microfiltration, reverse osmosis, and ultraviolet light.

To help protect groundwater resources, the District evaluates potential groundwater quality changes near sites irrigated with tertiary treated recycled water. Figure 24 presents monitoring wells near facilities using recycled water for irrigation. Over the past couple of years the District has monitored three sites (one in the Santa Clara Subbasin and two in the Llagas Subbasin. In addition, as part of the recycled water pipeline expansion, new monitoring sites were added in 2014 to establish baseline groundwater quality prior to recycled water use. The District also evaluates data collected by SBWR and others as shown in Table 12. Statistical analysis of trends and geochemical methods are used to evaluate water quality changes.

As shown in Table 13, monitoring results at several sites show increasing trends for salts and low-level detections of NDMA, PFCs, and other constituents. In most cases, these contaminants were not present prior to the use of recycled water. There is some evidence that recycled water is mixing with shallow groundwater based on the geochemical analysis of groundwater, which appears to be shifting toward that of recycled water in several wells. Based on these findings, it is likely that changes in shallow groundwater quality are occurring as a result of irrigation with recycled water. The District will continue to analyze data from these sites, and will evaluate SBWR data to determine if shallow groundwater quality improves with time due to the blending of tertiary treated recycled water and SVAWPC water. The District will continue to work with stakeholders to identify ways to reduce contaminant loading.

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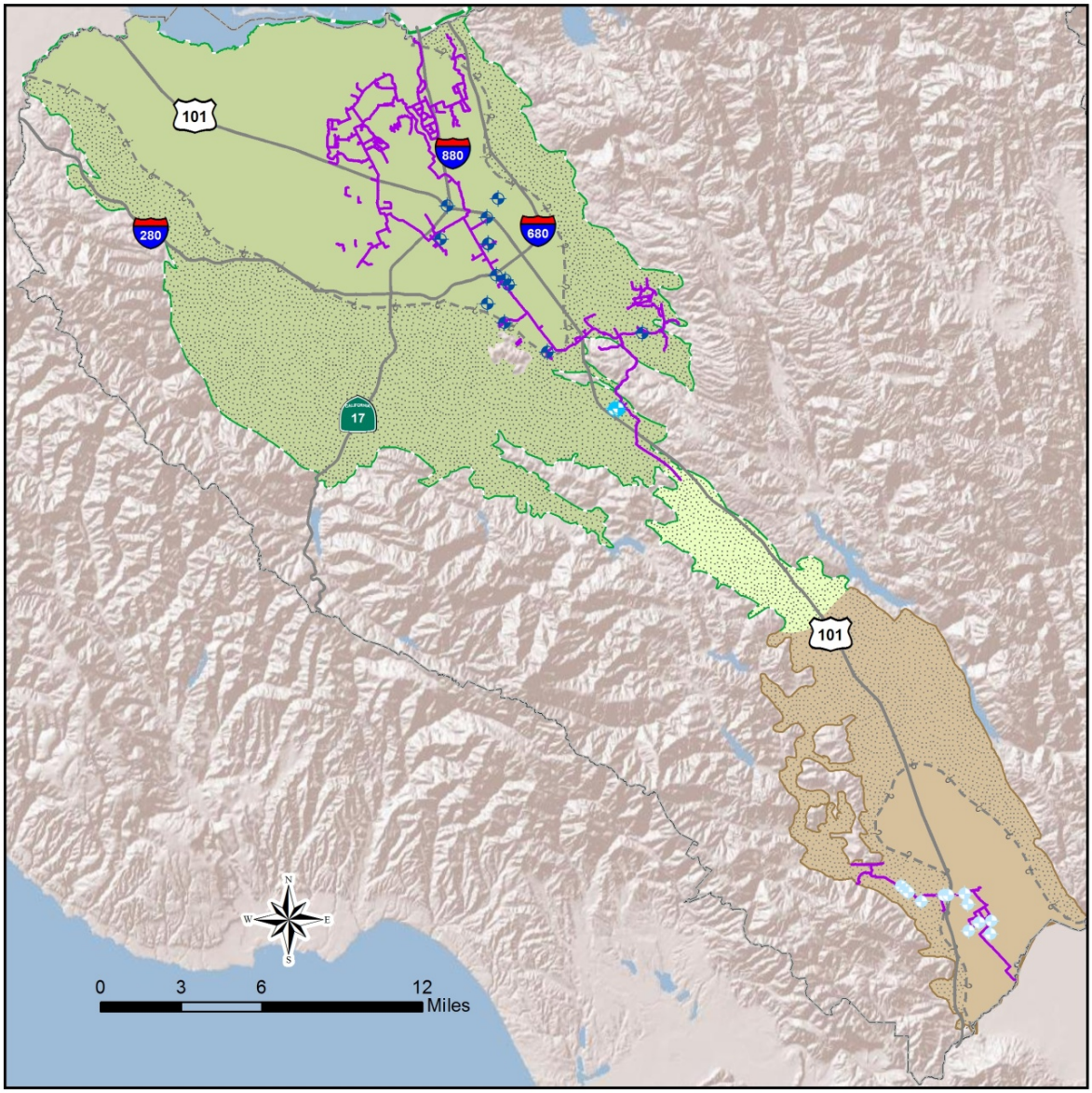
[15] Recycled water is produced at the Palo Alto Regional Water Quality Control Plant, San Jose/Santa Clara Water Pollution Control Plant (WPCP), the Sunnyvale WPCP and the South County Regional Wastewater Authority.

[16] Advanced Recycled Water Treatment Feasibility Project, Black & Veatch, Kennedy/Jenks for the Santa Clara Valley Water District, August 2003.

[17] California GAMA Program: Fate and Transport of Wastewater Indicators: Results from Ambient Groundwater and from Groundwater Directly Influenced by Wastewater, Lawrence Livermore National Laboratory and California State Water Resources Control Board, June 2006.

[18] Locus Technologies for Santa Clara Valley Water District, Recycled Water Irrigation and Groundwater Study, Santa Clara and Llagas Groundwater Subbasins, Santa Clara County, California, August 2011.

Figure 24 Groundwater Monitoring Near Facilities Using Recycled Water for Irrigation



Recycled Water Irrigation Site Monitored By

- District
- District/IDT
- South Bay Water Recycling
- Recycled Water Pipeline

- Santa Clara County
- Approximate Extent of Confined Area
- Santa Clara Plain Confined Area
- Santa Clara Plain Recharge Area
- Coyote Valley Recharge Area
- Llagas Confined Area
- Llagas Recharge Area

Santa Clara Valley Water District

Table 12 2014 Groundwater Monitoring near Recycled Water Irrigation Sites

Subbasin	Location	Sampling Agency	Sampling Summary
Santa Clara Subbasin	Integrated Device Technology (IDT) Campus, Edenvale area of San Jose	IDT and District	• 4 shallow wells were sampled in March. The wells were dry in September and could not be sampled. • Parameters analyzed include basic water quality parameters, ions, disinfection by-products (DBPs), perfluorochemicals (PFCs), bacterial parameters, and others commonly encountered in recycled water.
	Various Locations in San Jose	City of San Jose	• 6 shallow and 5 deep wells were monitored in February per the City's Groundwater Mitigation and Monitoring Plan (GMMP). • Parameters analyzed include basic salts and minerals, alkalinity and TDS.
Llagas Subbasin	Christmas Hill Park, Gilroy	District	• 3 shallow wells were sampled for three quarters. The wells were not sampled in September as they were dry. The scheduled December 2014 sampling event was postponed to January 2015. • Parameters analyzed include basic water quality parameters, ions, DBPs, PFCs, bacterial parameters, and others commonly encountered in treated recycled water.
	Irrigated Land Near SCRWA Plant, Gilroy	District	• 4 shallow wells were sampled on a quarterly basis. 1 well was not sampled in September as it was dry. The December 2014 sampling event was postponed to January 2015. • Parameters analyzed include basic water quality parameters, ions, DBPs, PFCs, bacterial parameters, and others commonly encountered in treated recycled water.
	Irrigated Land Along Phase 1B Pipeline Alignment in Gilroy	District	• In June, 5 new monitoring wells were added as part of the recycled water pipeline expansion. 4 shallow monitoring wells and 1 deep well were sampled on a quarterly basis. A few wells, which were sometimes dry, were not sampled. The scheduled December 2014 sampling event was postponed to January 2015. • Parameters analyzed include basic water quality parameters, ions, DBPs, PFCs, bacterial parameters, and others commonly encountered in treated recycled water.

Table 13 Key Findings from Recycled Water Irrigation Site Monitoring

Subbasin	Location	Highlights
Santa Clara Subbasin	IDT	• Through March 2014, basic chemical composition is stable compared to previous events. • Increasing trends continue to be observed at 3 of the 4 wells for bromide, chloride, calcium, sodium, TDS, and dissolved oxygen. • Notable groundwater detections include perfluorooctanesulfonic acid (PFOS) in well MW3 at 5.8 ng/L and perfluoro-octanoic acid (PFOA) in MW4 at 15 ng/L.
	SBWR	• The basic chemical composition for various wells indicates a shift towards more saline water, primarily due to increasing chloride at the Curtner, Kelley Park, Columbus Park, Watson Park and Evergreen Park wells. • Increasing trends continue to be observed for chloride, boron, sodium, and sulfate at the majority of GMMP wells.
Llagas Subbasin	Christmas Hill Park	• Groundwater quality at wells 11S03E12A002 and 110S03E12A003 have similar sodium and chloride molar ratios as recycled water and show a slight ionic shift towards recycled water. • Groundwater quality at well 11S03E01Q002 continues to be influenced by adjacent Uvas Creek. • Sulfate and chloroform trends in well 11S03E12A002 are decreasing, and only sulfate trends are decreasing in well 11S03E12A00. TDS and chloride trends in well 11S03E12A003 are increasing. • Potassium, sodium and sulfate trends are decreasing in well 11S03E01Q002. • Notable detections include PFOA in two wells and nitrosodi-n-butylamine (NDBA) at one well.
	Irrigated Land Near SCRWA	• Groundwater quality at wells 11S04E15M002, 110S04E16F001 and 11S04E16M011 indicate similar molar ratios as recycled water. • The basic chemical composition for all wells (except deep well 11S04E16G003) indicates a shift towards recycled water, in particular for chloride, sodium and potassium. • Increasing trends were observed for TDS in well 11S04E16F001, and for chloride, sodium, and PFBA in well 11S04E15M002. • Decreasing trends were observed for potassium, sulfate and sodium at the remaining wells. • Salt concentrations in most wells were considerably higher than regional shallow groundwater for chloride, sodium, boron, and sulfate. • The secondary MCL for TDS was exceeded in all wells. • Notable detections include perfluorochemicals and NDPA, with NDBA detected at one well.
	Irrigated Land Along Phase 1B Pipeline Alignment in Gilroy	• With the exception of well 11S04E09M001, basic chemical composition is likely representative of background groundwater chemistry. Further data is needed to confirm this assertion. • Well 11S04E09M001 was only sampled once, but salt concentrations are similar to those observed in recycled water. • Notable detections in three wells just north of SCRWA include PFOA, PFBA and PFOS. • No trends could be determined for these wells due to the lack of sufficient monitoring events at this time.

5.6 Salt and Nutrient Management Plans

The State Water Resources Control Board Recycled Water Policy requires the development of regional Salt and Nutrient Management Plans (SNMPs). The purpose of the SNMPs is to address current and future regional salt and nutrient loading to groundwater from all sources, including recycled water and agricultural activity. The District completed two SNMPs for the Santa Clara and Llagas Subbasins by working with local stakeholders and regulators, and completing detailed salt balance analyses. The plans are posted to the District's website[19] and include: salt and nutrient source identification, loading and assimilative capacity estimates, water recycling and storm water recharge goals and objectives, implementation measures, groundwater monitoring provisions, and an anti-degradation analysis.

5.7 Contaminant Release Sites

There are over 400 open cases where non-fuel contaminants have been released to soil and/or groundwater in the county. These cases are overseen by the California Department of Toxic Substances Control, and the Central Coast and San Francisco Regional Water Quality Control Boards. There are also over 150 open fuel leak sites and 25 Superfund sites. Although there have been very limited impacts to principal drinking water aquifers from these sites, they pose a potential threat to groundwater quality.

Due to the large number of contaminated sites, District staff prioritizes which cases are closely tracked. Currently, staff monitors progress at 11 sites considered to be of the highest priority based on groundwater vulnerability, proximity to water supply wells or surface water, and contaminant concentration.

District staff reviews monitoring and progress reports submitted to regulatory agencies by responsible parties, as well as any regulatory orders or correspondence. Staff attends community meetings for the Olin, Middlefield-Ellis-Whisman (MEW), and Moffett Field cases, and advocates for expedited cleanup of high-threat cases through collaboration with regulatory agencies. The District also provides technical review of other contaminant release sites when requested by regulatory agencies.

Key 2014 activities related to high priority contaminant release cases are as follows:

- Olin Corporation, 425 Tennant Avenue, Morgan Hill
  Perchlorate cleanup activities, including the off-site extraction system, continued. As of September 2014, over 2,050 AF of water have been treated and 167 pounds of perchlorate have been removed. Olin's sampling in preparation for the Gradient Driven Remediation (GDR) pilot study found perchlorate further east of the site than expected, which led to additional characterization activities to better define the extent of contamination. The District sent a letter to the Central Coast Regional Water Quality Control Board in August 2014 requesting that approval of the GDR pilot study be postponed pending the results of the additional characterization and a re-evaluation of the capture zone. Staff continues to participate in the Perchlorate Community Advisory Group meetings.

[19] http://www.valleywater.org/GroundwaterStudies/

- Hillview Cleaners, 1440 Big Basin Way, Saratoga
  The Hillview Cleaner site is a dry cleaner site that has released perchloroethene (PCE) to soil and groundwater. PCE has also been detected in Saratoga Creek. District staff met with the San Francisco Regional Water Quality Control Board case worker for the site in September 2014. The responsible party and property owner are in agreement on pursuing in-situ remediation to address the off-site contamination. District staff communicated that the off-site remediation should be expedited and the clean-up level should be the drinking water standard.

- Moffett Field, Middlefield-Ellis-Whisman (MEW)
  This area includes four Superfund sites and more than 15 individual contaminant release sites with soil and shallow groundwater contamination by trichloroethene (TCE) and other VOCs. District staff continues to participate in related MEW, Moffett Field Regional Advisory Board and EPA community meetings.

- UTC
  There were no detections of perchlorate or 1,4-dioxane in the creek draining to Anderson Reservoir in 2014; however, only 3 of 90 attempts to collect samples were successful due to dry creeks. In 2014, nearly 20% of monitoring wells could not be sampled due to dry wells. The first round of sampling showed stable concentration trends, consistent with previous sampling data. The Central Groundwater Treatment System extraction wells continue to prevent the migration of contaminated groundwater and monitoring results indicate that in-situ bioremediation trenches are performing as designed. Four new monitoring wells were installed on the perimeter of the perchlorate and VOC plumes associated with the former Open Burn Facility, to verify that migration is not occurring. In 2014, additional data was collected in piezometers set in streambeds to assess the duration and volume of contaminated groundwater discharge to streams draining to Anderson Reservoir. Dry conditions hampered data collection in 2014.

- Fuel Leak Cases
  District staff continues to coordinate with the Santa Clara County Department of Environmental Health (DEH) to provide technical support and review as necessary. The District submitted comment letters on the proposed closures for the San Jose Crane & Rigging (660 Giguere Court, San Jose) and S&W Company (1607 and 1611 Terminal Avenue, San Jose) sites.

The evaluation of 2014 groundwater quality data against GWMP outcome measures is summarized below. Additional discussion of outcome measures, including planned action to address measures not being met, is presented in Section 7.

Groundwater Quality Outcome Measures

OM 2.1.1.e.
At least 95% of countywide water supply wells meet primary drinking water standards.

OM 2.1.1.f.
At least 90% of South County wells meet Basin Plan agricultural objectives.

OM 2.1.1.g.
At least 90% of wells in both the shallow and principal aquifer zones have stable or decreasing concentrations of nitrate, chloride, and total dissolved solids.

OM 2.1.1.e. is not met as only 80% of countywide water supply wells tested in 2014 met primary drinking water standards due to elevated nitrate in South County (mainly in domestic wells). If nitrate is not included, 99% of water supply wells met primary drinking water standards.

OM 2.1.1.f. is met as 98% of all South County wells met Basin Plan agricultural objectives in 2013.

OM 2.1.1.g. is partially met. This measure is nearly met for chloride, with 87% of wells showing stable or decreasing concentrations. This measure is met for nitrate as 91% of wells had stable or decreasing concentrations. This measure is met for total dissolved solids as 94% of wells had stable or decreasing concentrations.

6. OTHER GROUNDWATER MANAGEMENT ACTIVITIES

Other District groundwater management activities in 2014 included permitting and inspecting over 1,700 wells, reviewing relevant policy and land use proposals, and conducting public outreach on groundwater.

6.1 Well Ordinance Program

The District's well ordinance program helps ensure that wells and other deep excavations are properly constructed, maintained, and destroyed so they prevent vertical transport of contaminants into deep drinking water aquifers. The District issued over 2,100 well permits in 2014, primarily for well destruction and monitoring well construction. The District also inspected nearly 1,800 wells to ensure they were properly constructed or destroyed (Table 14).

Table 14 2014 District Well Permit and Inspection Summary

Permit Type	Number Processed
Well Construction - Water Producing Wells	98
Well Construction - Monitoring Wells	391
Well Destruction	1,430
Exploratory Boring	217
Total	**2,136**
Inspection Type	**Number Inspected**
Well Construction - Water Producing Wells	67
Well Construction - Monitoring Wells	340
Well Destruction	1,222
Exploratory Boring	151
Total	**1,780**

6.2 Policy and Legislation Review

The District reviews proposed legislation and policies (both statewide and local) to ensure the county's water resources and the District's ability to manage them are protected. In September 2014, Governor Brown signed the Sustainable Groundwater Management Act (SGMA) into law to promote the local, sustainable management of groundwater supplies. The District closely followed the development of SGMA as it related to District authorities and new tools to advance sustainable groundwater management in Santa Clara County, and is reviewing related Department of Water Resources (DWR) regulations as they are developed.

SGMA requires the formation of Groundwater Sustainability Agencies (GSAs) for all groundwater subbasins classified as medium or high priority by June 30, 2017. A Groundwater Sustainability Plan (GSP) or an alternative plan must be submitted for these basins by January 2020 for basins in critical overdraft, or by January 2022 for other basins. SGMA provides broad authorities to GSAs, including the ability to meter wells, restrict pumping, implement conjunctive management projects and fund them through various fees. These authorities are in addition to any authority provided through existing statute, such as what is provided by the District Act.

The District is subject to SGMA requirements as the Santa Clara and Llagas Subbasins are designated as medium priority and high priority, respectively. Although SGMA names the District as the exclusive groundwater management agency for Santa Clara County, it grants authorities specifically to GSAs. Also, some funding opportunities may only be available for GSAs, rather than other groundwater management agencies. Electing to be the GSA requires a public hearing, Board resolution, and submittal of a Notice of Intent to DWR.

DWR will develop regulations for GSPs or alternative plans by June 2016. It is assumed that the District's GWMP will require only minor updates to qualify as an alternative plan that meets SGMA requirements. This update will be done in consultation with water retailers and other stakeholders, with a target Board adoption date of June 2016.

6.3 Land Use Review

Threats to groundwater quality include urban runoff, industrial chemical releases, inefficient agricultural practices, and leaking underground storage tanks. Of particular concern are potentially contaminating activities over groundwater recharge areas, which are more vulnerable to contamination due to more permeable soils and higher groundwater flow rates. Land use decisions fall under the authority of the local cities and the County of Santa Clara. The District reviews land use and development plans related to District facilities and watercourses under District jurisdiction, and provides technical review for other land use proposals as requested by the local agency. For all land use reviews, the District comments focus on specific actions (such as groundwater monitoring or analysis) to ensure groundwater resources are adequately protected.

6.4 Public Outreach

Public outreach is an important component of the District's groundwater protection efforts. To help keep the public informed about current groundwater and water supply conditions, the District prepares monthly Water Tracker reports that are posted on the District website[20]. The District also posts monthly groundwater condition reports that contain more detailed information on groundwater pumping, recharge, and water levels.

Because groundwater is far removed from the public's view, it can be a challenge to make the connection that actions occurring on the land surface can impact groundwater quality. In 2014, the District celebrated Groundwater Awareness Week (March 8-14) by adopting a Board resolution commemorating the week, hosting a groundwater open house highlighting groundwater on the District website, and posting social media messages.

The District also maintained its status as a Groundwater Guardian Affiliate through the Groundwater Guardian Program sponsored by the Groundwater Foundation, a non-profit organization. Groundwater Guardian is an annually earned designation for communities and affiliates that take voluntary, proactive steps toward groundwater protection. District activities include the school program (which reaches thousands of students each year), implementation of groundwater protection programs, and participation in workshops such as the Small Acreage Stewardship series. At this series, District staff presents targeted information on wells and water quality protection to well owners.

[20] www.valleywater.org/WaterTracker.aspx

protection programs, and participation in workshops such as the Small Acreage Stewardship series. At this series, District staff presents targeted information on wells and water quality protection to well owners.

The District mailed the 2014 Groundwater Quality Summary to all well owners in June to provide information on sampling by the District and local water suppliers in 2014 (Appendix A). This summary is similar to water retailer consumer confidence reports, and provides basic groundwater quality information to domestic well owners who do not typically receive water from a water retailer.

7. CONCLUSIONS

Groundwater conditions were affected by the continuing drought in 2014. Table 15 shows data for key indicators as compared to last year and the last five year (2009 to 2013). The managed recharge program was significantly reduced compared to the previous year and 5-year average due to the lack of imported and local surface water. Groundwater pumping increased, resulting in a decrease in groundwater storage of 81,100 AF. Similarly, groundwater levels were significantly lower than 2013 and the previous five years due to ongoing dry conditions, but they remained above historical minimums. Groundwater quality conditions were generally similar to the previous year and the last five years, with nitrate remaining the primary groundwater protection challenge, particularly in South County.

Table 15 2014 Groundwater Conditions as Compared to Other Indices

Index[1]	2014	Compared to 2013	Compared to Last 5 Years (2009 - 2013)
Managed Recharge (AF)	25,800	Down 75%	Down 74%
Groundwater Pumping (AF)	168,400	Up 9%	Up 20%
Groundwater as % of Total Water Use	50%	Up 9%	Up 10%
Groundwater Levels (feet)[2]			
Santa Clara Plain	41.33	Down 41%	Down 46%
Coyote Valley	257.71	Down 2%	Down 3%
Llagas Subbasin	193.15	Down 10%	Down 13%
End of Year Groundwater Storage (AF)	257,200	Down 24%	--
Land Subsidence (feet/year)[3]	0.008	Increase	--
Groundwater Quality (mg/L)[4]			
Santa Clara Plain - TDS	410	No Change[5]	Increase
Coyote Valley - TDS	370	No Change	No Change
Llagas Subbasin - TDS	382	No Change	No Change
Santa Clara Plain - Nitrate	13	No Change	No Change
Coyote Valley - Nitrate	15.2	No Change	No Change
Llagas Subbasin - Nitrate	20.5	No Change	No Change

1) Groundwater levels and quality are shown for three groundwater management areas: the Santa Clara Plain and Coyote Valley (which comprise the Santa Clara Subbasin) and the Llagas Subbasin.
2) Groundwater elevations represent the average of all readings at index wells for the time period noted.
3) The established tolerable rate of 0.01 feet per year was not exceeded. Water levels at all subsidence index wells were above these thresholds throughout 2014, except for one well, where the water level was temporarily below the threshold in summer/early fall.
4) Values shown represent median groundwater quality for all principal aquifer zone wells tested. Nitrate is measured as NO_3.
5) Individual wells sampled for TDS and nitrate vary each year so a straight numeric comparison of median values is not performed. "No change" indicates no significant difference using an appropriate statistical test (Mann-Whitney Test) at 95% confidence level. An entry of either "Increase" or "Decrease" indicates a statistically significant change for the time period indicated.

Outcome Measure Performance and Action Plan

The District's GWMP identifies several outcome measures to assess whether basin management objectives are being accomplished. The measurement of 2014 data against these measures is summarized in Table 16 below, along with recommended actions to address measures not being met.

Table 16 Summary of Outcome Measure Performance and Action Plan

Groundwater Storage	**OM 2.1.1.a.** Greater than 278,000 AF of projected end of year groundwater storage in the Santa Clara Plain. Estimated end of 2014 Storage: 235,700 AF **OM 2.1.1.b.** Greater than 5,000 AF of projected end of year groundwater storage in the Coyote Valley. Estimated end of 2014 Storage: 5,400 AF **OM 2.1.1.c.** Greater than 17,000 AF of projected end of year groundwater storage in the Llagas Subbasin. Estimated end of 2014 Storage: 16,100 AF
	Action Plan for OM 2.1.1.a and OM 2.1.1.c: In accordance with the Water Shortage Contingency Plan, the District called for a 20% countywide water use reduction in February 2014. Due to ongoing dry conditions, the savings target was increased to 30% in March 2015.
Groundwater Levels and Subsidence	**OM 2.1.1.d.** 100% of subsidence index wells groundwater levels above subsidence thresholds. All ten subsidence index wells had groundwater levels above thresholds in 2014, with the exception of one well that exceeded the threshold between July and October.
	Action Plan for OM 2.1.1.a: Implement Water Shortage Contingency Plan and increase monitoring frequency.
Groundwater Quality	**OM 2.1.1.e.** At least 95% of countywide water supply wells meet primary drinking water standards. Only 80% of countywide water supply wells tested in 2014 met primary drinking water standards due to elevated nitrate in South County (mainly in domestic wells). If nitrate is not included, 99% of water supply wells met primary drinking water standards. **OM 2.1.1.f.** At least 90% of South County wells meet Basin Plan agricultural objectives. Nearly all wells (98%) met Basin Plan agricultural objectives.
	Action Plan for OM 2.1.1.e: Implement Salt and Nutrient Management Plans to address salt loading, and work to increase participation in the nitrate treatment system rebate program.
Groundwater Quality Trends	**OM 2.1.1.g.** At least 90% of wells in both the shallow and principal aquifer zones have stable or decreasing concentrations of nitrate, chloride, and total dissolved solids. This measure is nearly met for chloride, with 87% of wells showing stable or decreasing concentrations. This measure is met for nitrate as 91% of wells had stable or decreasing concentrations. This measure is met for total dissolved solids as 94% of wells had stable or decreasing concentrations.
	Action Plan for OM 2.1.1.g: Implement Salt and Nutrient Management Plans to address salt loading.

Outcome measure met
Outcome measure not met

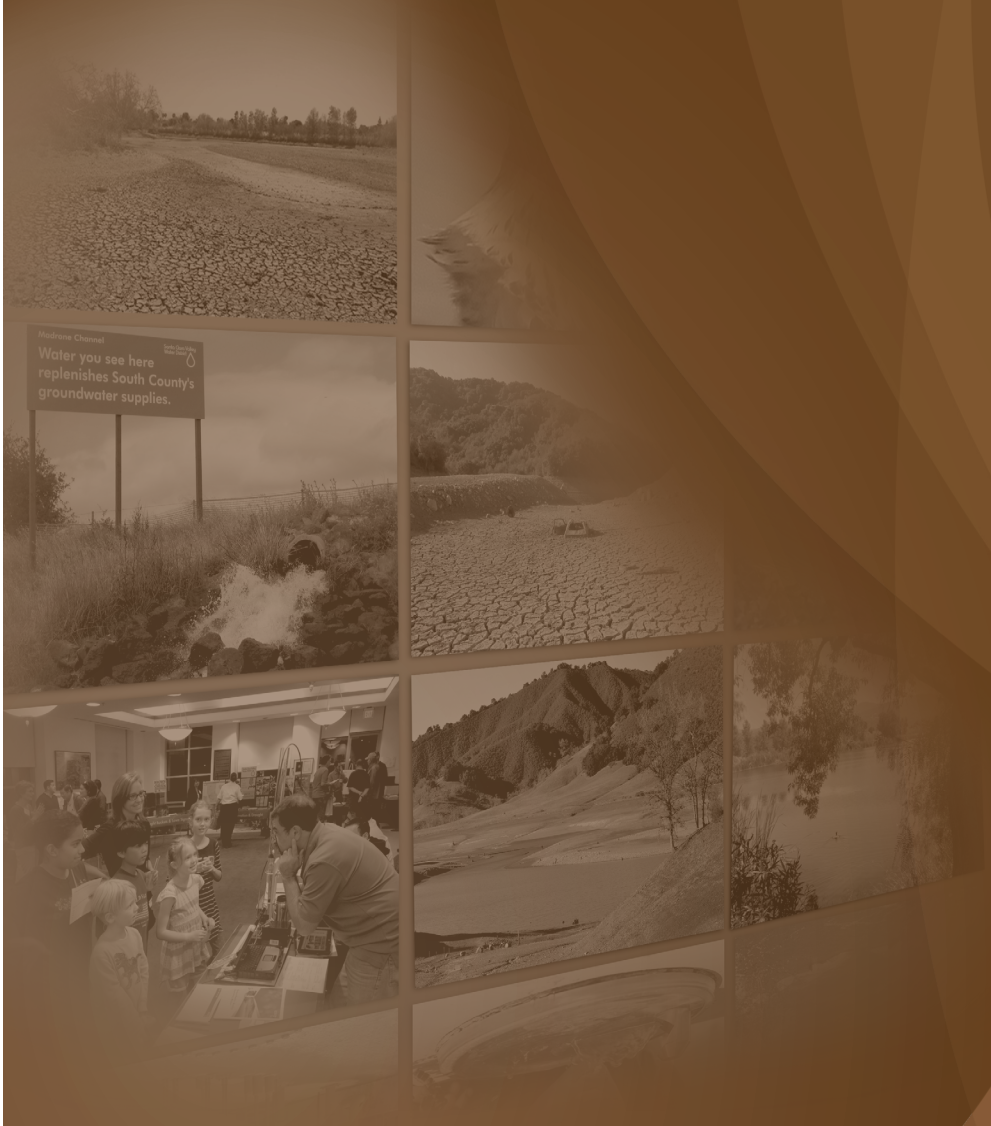
Groundwater Outlook

Groundwater levels and storage will continue to decline as dry conditions persist and little surface water is available for managed recharge. Groundwater storage has been critical in helping to meet the county's water supply needs during the ongoing drought. The estimated end of year storage for 2014 was below the 300,000 AF target and water levels approached or temporarily exceeded subsidence thresholds in several index wells. In accordance with the Water Shortage Contingency Plan, the District Board set a 20% water use reduction target in February 2014, which was increased to 30% in March 2015.

The District continues to actively monitor groundwater levels, land subsidence, and water quality to support operational decisions and ensure groundwater resources are protected. To help ensure water supply reliability, the District is also working to expedite several Indirect Potable Reuse (IPR) projects to provide a drought-proof source of purified water for groundwater replenishment. The District will also continue to track proposed legislation, policies, and regulatory standards that may impact groundwater resources or the District's ability to manage them.

Appendix A – 2014 Groundwater Quality Summary Provided to Well Owners

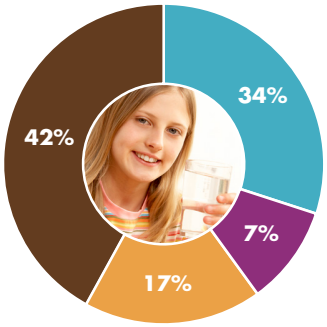
Groundwater Quality Summary Report



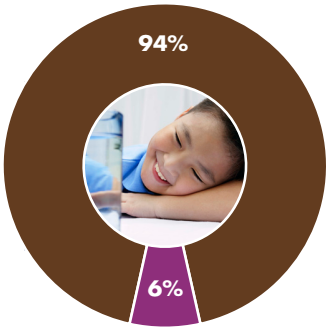
For Testing Performed in 2014

Santa Clara Valley Water District

NORTH COUNTY WATER USE



SOUTH COUNTY WATER USE



- Groundwater
- Treated Water
- Hetch-Hetchy
- Other Local and Recycled Water

Safeguarding our groundwater

Groundwater is an essential local resource, providing about half of the water used in Santa Clara County each year. In some areas, groundwater is the only source of drinking water. Protecting our groundwater helps ensure adequate supplies are available now and in the future.

The Santa Clara Valley Water District works to safeguard groundwater by:

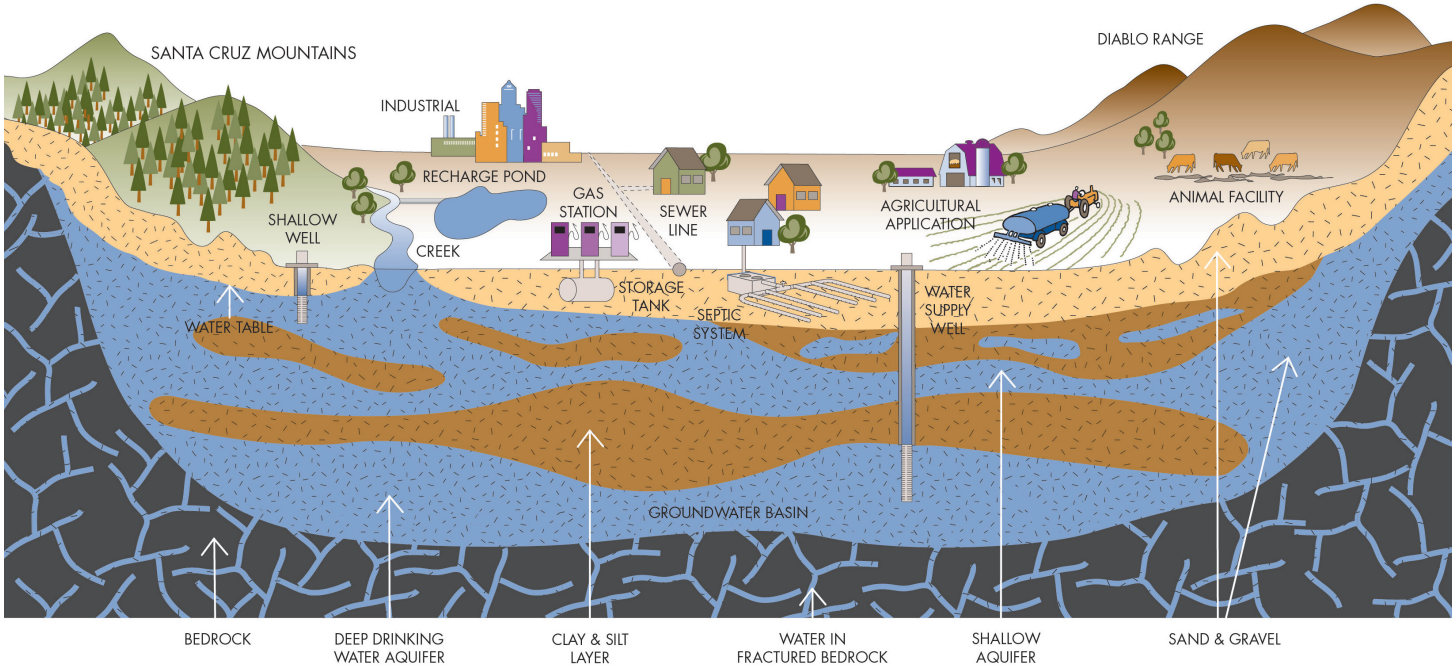
- Replenishing groundwater with local and imported surface water.
- Reducing demands on groundwater through the delivery of treated water and with water conservation and recycling.
- Monitoring groundwater and implementing programs to protect against contamination.

Regular testing of wells throughout the county indicates that groundwater quality is generally very high. Drinking water, including bottled water, may contain at least small amounts of some contaminants. The presence of natural or man-made contaminants does not necessarily indicate that water poses a health risk. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and in some cases, radioactive material, and can pick up substances from animal and human activities.

Contaminants that may be present include:

- Microbial contaminants such as viruses and bacteria that may come from sewage treatment plants, septic systems, agricultural operations and wildlife.
- Inorganic contaminants such as salts and metals that can be naturally occurring or result from stormwater runoff, industrial or domestic wastewater discharges, animal facilities, mining or farming.
- Pesticides, fertilizers and herbicides that may come from agriculture, stormwater runoff and residential uses.
- Organic chemicals including synthetic and volatile organic chemicals from industrial processes, gas stations, storm water runoff, agricultural application and septic systems.
- Radioactive contaminants that are typically naturally occurring in our area.

Everyone has a role in protecting groundwater. Well owners should make sure wells are properly constructed and maintained and should create a zone of protection around the well. See the water district's Guide for the Private Well Owner at www.valleywater.org for helpful tips. Residents can help by conserving water and by raising awareness that we live on top of our drinking water. Protect your water by teaching your family, friends, and neighbors to avoid polluting our groundwater.



Groundwater monitoring confirms water is of high quality

As part of our comprehensive groundwater management efforts, the water district sampled over 200 domestic water supply wells and evaluated data collected at over 250 wells by local water suppliers. The table below summarizes groundwater quality results for North and South County (see map on back page.) The 2014 results show that nearly all wells tested meet drinking water standards. The primary exception is nitrate, which is an ongoing groundwater protection challenge.

Water from public water systems must meet Maximum Contaminant Levels (MCLs), but domestic systems are not subject to these standards. It should be noted that not every well was tested for all parameters shown, and only parameters that were detected in water supply wells are listed. Water quality standards, including MCLs, are shown to provide context for groundwater quality results. This is a regional summary and may not reflect the water quality in your well since every property and well is unique.

Primary Drinking Water Standards - Public Health Related Standards				North County		South County		
Inorganic Contaminants	UNITS	PRIMARY MCL	PHG	MEDIAN	RANGE	MEDIAN	RANGE	Typical Sources
Aluminum	ppb	1,000	600	4.83	ND - 1,100[1]	9.99	ND - 760	Erosion of natural deposits; residue from some surface water treatment processes
Antimony	ppb	6	20	0.008	0.005 - 0.022	NA	NA	Discharge from industrial processes; fire retardants; ceramics; electronics; solder
Arsenic	ppb	10	0.004	0.46	ND - 4.8	0.75	ND - 2	Erosion of natural deposits; glass and electronics production waste
Asbestos	MFL	7	7	NA	NA	ND	ND - 4.6	Erosion of natural deposits
Barium	ppb	1,000	2,000	150	ND - 310	102	ND - 300	Erosion of natural deposits
Beryllium	ppb	4	1	ND	ND - 0.002	NA	NA	Discharge from electrical, aerospace, and defense industries
Cadmium	ppb	5	0.04	0.008	0.001 - 0.014	NA	NA	Corrosion of galvanized pipes; erosion of natural deposits; runoff from waste batteries and paints
Chromium (total)	ppb	50	—	3.8	ND - 13	1.59	ND - 18	Erosion of natural deposits; metal plating
Chromium-6 (hexavalent)	ppb	10	0.02	1.8	ND - 8.8	ND	ND - 6.9	Erosion of natural deposits
Fluoride (natural source)	ppm	2	1	0.11	ND - 0.84	0.14	ND - 0.55	Erosion of natural deposits
Nickel	ppb	100	12	1.52	ND - 130[1]	0.59	ND - 6.07	Erosion of natural deposits
Nitrate (as NO3)	ppm	45	45	13	ND - 77.5	24	ND - 184	Runoff from fertilizer use; leaching from septic tank sewage; erosion of natural deposits
Nitrate + Nitrite (as N)	ppm	10	10	3	ND - 7.5	4	ND - 5.3	Runoff from fertilizer use; leaching from septic tank sewage; erosion of natural deposits
Nitrite (as N)	ppb	1	1	NA	NA	ND	ND - 0.4	Runoff from fertilizer use; leaching from septic tank sewage; erosion of natural deposits
Perchlorate	ppb	6	6	NA	NA	ND	ND - 5.9	Solid rocket propellant, fireworks, explosives, flares, matches, and a variety of industries
Selenium	ppb	50	30	1.08	ND - 7.5	ND	ND - 2	Erosion of natural deposits
Thallium	ppb	2	0.1	ND	ND - 0.008	NA	NA	Discharge from electronics, glass, and drug factories
Radioactive Contaminants								
Gross Alpha	pCi/L	15	—	0.96	ND - 4.2	1.03	ND - 6.3	Erosion of natural deposits
Uranium	pCi/L	20	0.43	0.34	ND - 1.38	NA	NA	Erosion of natural deposits
Volatile Organic Chemicals								
1,1,1-Trichloroethane (1,1,1-TCA)	ppb	200	1,000	ND	ND - 2.8	NA	NA	Discharge from metal degreasing sites and other industrial processes
1,1-Dichloroethene (1,1-DCE)	ppb	6	10	ND	ND - 4.7	NA	NA	Discharge from industrial processes
Haloacetic Acids (HAA5)	ppb	60	—	25.6	25.6 - 25.6	NA	NA	Byproduct of drinking water disinfection
Tetrachloroethene (PCE)	ppb	5	0.06	NA	NA	ND	ND - 3.5	Discharge from industrial processes, dry cleaners, and automotive repair
Total Trihalomethanes (THMs)	ppb	80	—	ND	ND - 37.04	NA	NA	Byproduct of drinking water disinfection

Notes: 1) Confirmation samples did not indicate aluminum or nickel at concentrations exceeding the MCL
2) The table shows the number of domestic wells tested that had bacteria present or absent. Public water systems are required to ensure that fewer than 5% of samples have total coliform present and that no samples have e.coli present. Domestic wells are not subject to these standards.

Terms and Definitions

Color units: A measure of color in water

Maximum Contaminant Level (MCL): The highest level of a contaminant allowed in public water systems. Primary MCLs are set as close to PHGs as is economically and technologically feasible. Secondary MCLs protect the odor, taste and appearance of drinking water.

Median: The "middle" value of the results, with half of the values above the median value and half of the values below the median value.

MFL: = Million Fibers per Liter

NA: Not analyzed

ND: Not detected (at laboratory testing limit)

NTU: Nephelometric Turbidity Units

pCi/L: picoCuries per liter (a measure of radiation)

ppm: parts per million (milligrams per liter)

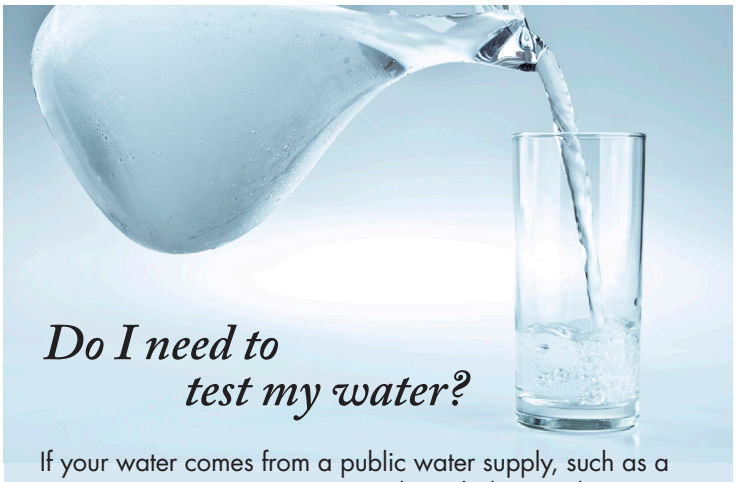
ppb: parts per billion (micrograms per liter)

Public Health Goal (PHG): The level of a contaminant in drinking water below which there is no known or expected risk to human health. PHGs are set by the California EPA.

TON: Threshold Odor Number

uS/cm: microSiemens per centimeter (a measure of the dissolved inorganic salt content)

	UNITS	SECONDARY MCL	PHG	North County MEDIAN	North County RANGE	South County MEDIAN	South County RANGE	
Microbiological Contaminants[2]				**Present**	**Absent**	**Present**	**Absent**	**Typical Sources**
Total Coliform Bacteria				9	8	48	129	Naturally present in the environment
E. Coli Bacteria				0	17	1	176	Human and animal fecal waste
Secondary Drinking Water Standards - Aesthetic Standards								
Chloride	ppm	250	—	46	20 - 110	50.5	19 - 147	Runoff/leaching from natural deposits; seawater influence
Color	color units	15	—	ND	ND - 12	ND	ND - 10	Naturally-occurring organic materials
Copper	ppb	1,000	300	1.34	1.27 - 6.90	2.96	ND - 12.1	Internal corrosion of household plumbing systems; erosion of natural deposits
Iron	ppb	300	—	74.09	ND - 2,600	32.4	ND - 1,300	Leaching from natural deposits; industrial wastes
Manganese	ppb	50	—	0.89	ND - 170	2.20	ND - 120	Leaching from natural deposits; industrial wastes
Odor Threshold	TON	3	—	ND	ND - 2	1	ND - 5	Naturally-occurring organic materials
pH	pH units	6.5 - 8.5	—	7.4	6.94 - 8.10	7.60	7.4 - 7.9	Carbon dioxide emissions; rainfall; erosion of natural deposits
Specific Conductance	uS/cm	900	—	725	431 - 1,520	612	86 - 3,400	Substances that form ions when in water; seawater influence
Sulfate	ppm	250	—	49	12.7 - 110	37.4	ND - 194	Runoff/leaching from natural deposits; industrial wastes
Total Dissolved Solids (TDS)	ppm	500	—	437	270 - 780	361	250 - 674	Runoff/leaching from natural deposits
Turbidity	NTU	5	—	0.24	ND - 8.5	0.45	ND - 12	Soil runoff
Zinc	ppb	5,000	—	4.28	ND - 15.2	4.11	ND - 140	Runoff/leaching from natural deposits; industrial wastes
Other Water Quality Parameters								
Alkalinity (total, as CaCO3)	ppm	—	—	230	120 - 400	185	96 - 345	Atmospheric and vadose zone carbon dioxide
Bicarbonate (as HCO3)	ppm	—	—	280	140 - 480	225	118 - 421	Atmospheric and vadose zone carbon dioxide
Boron	ppb	—	—	263	155 - 370	97.5	ND - 181	Erosion of natural deposits
Bromide	ppm	—	—	0.18	ND - 0.54	0.17	ND - 0.7	Seawater intrusion and sea spray
Bromodichloromethane (THM)	ppb	—	—	ND	ND - 1.98	NA	NA	By product of drinking water disinfection
Calcium	ppm	—	—	64	40 - 120	50.5	29 - 105	Erosion of natural deposits
Carbon Dioxide	ppm	—	—	20	ND - 90	NA	NA	Atmospheric sources; dissolution of carbonate rocks
Chlorate	ppb	—	—	66.5	64 - 69	NA	NA	Byproduct of drinking water disinfection
Chloroform (THM)	ppb	—	—	ND	ND - 35.1	NA	NA	Byproduct of drinking water disinfection
Dichloroacetic Acid (DCAA)	ppb	—	—	12.9	12.9 - 12.9	NA	NA	Byproduct of drinking water disinfection
Hardness (total, as CaCO3)	ppm	—	—	303	83 - 578	275	ND - 642	Erosion of natural deposits
Lead	ppb	—	0.2	0.185	0.058 - 0.96	0.1	ND - 19	Corrosion of household plumbing systems; discharges from industrial manufacturers; erosion of natural deposits
Lithium	ppb	—	—	14.25	7.5 - 21	9.2	ND - 26	Erosion of natural deposits; discharge from industrial uses
Magnesium	ppm	—	—	28	11 - 68	30.2	19.1 - 60	Erosion of natural deposits
Molybdenum	ppb	—	—	4	ND - 4	ND	ND - 1.3	Erosion of natural deposits
Orthophosphate	ppm	—	—	0.25	ND - 0.72	0.09	ND - 0.69	Leaching from natural deposits; agricultural runoff
Potassium	ppm	—	—	1.2	ND - 2.4	1.3	ND - 1.9	Erosion of natural deposits
Radium 228	pCi/L	—	0.019	ND	ND - 0.54	NA	NA	Erosion of natural deposits
Silica	ppm	—	—	23.5	22.1 - 24.8	24.7	13.5 - 37.6	Erosion of natural deposits
Sodium	ppm	—	—	33	15 - 140	28.3	13.2 - 63.2	Salt present in the water that is generally naturally-occurring
Trichloroacetic Acid (TCAA)	ppb	—	—	12.8	12.8 - 12.8	NA	NA	Byproduct of drinking water disinfection
Vanadium	ppb	—	—	NA	NA	ND	ND - 12	Erosion of natural deposits, cumbustion of fossil fuels



Do I need to test my water?

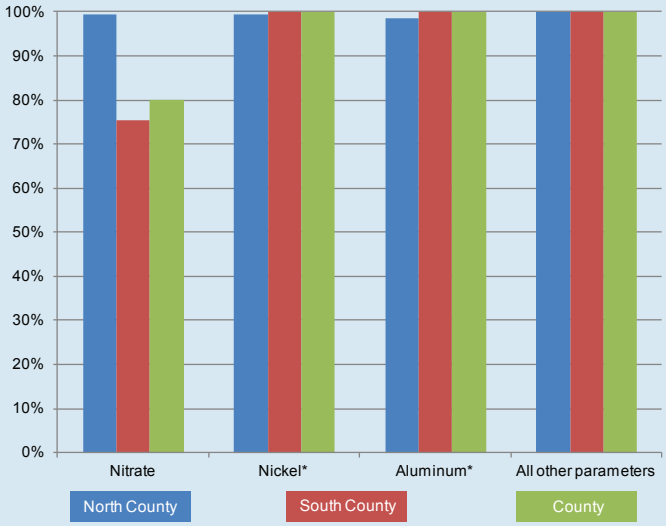
If your water comes from a public water supply, such as a city or water company, it is tested regularly to make sure that it meets state and federal drinking water standards.

If your water comes from a private well, you are responsible for making sure it is safe to drink. Although the water district monitors regional groundwater quality, every property and well has unique conditions. Some contaminants are colorless and odorless, so the surest way to protect your health is to have your water tested.

The water district encourages private well owners to have their well water tested by a state-certified laboratory annually or more often if there is a change in taste, odor or appearance. If your water contains any contaminant above drinking water standards, you may want to install a treatment system or use an alternative source of water.

The water district is currently offering free basic water quality testing for eligible domestic wells and rebates for nitrate treatment systems — call the Groundwater Hotline at **(408) 630-2300** to find out more.

PERCENTAGE OF WATER SUPPLY WELLS TESTED IN 2014 MEETING PRIMARY DRINKING WATER STANDARDS



*Confirmation samples did not indicate aluminum or nickel at concentrations exceeding the MCL.

Current Water Quality Issues

Nitrate

Common sources of nitrate are fertilizers, septic systems and livestock waste, so nitrate is often higher in rural and agricultural areas. As shown in the chart to the left, nitrate is an ongoing groundwater protection challenge, particularly in South County. Nitrate can interfere with the blood's ability to transport oxygen and is of greatest concern for infants and pregnant women. The effects of consuming high levels of nitrate are often referred to as "blue baby syndrome" and symptoms include shortness of breath and blueness of the skin.

The water district monitors nitrate to assess hot spots and trends, recharges groundwater which helps dilute nitrate, and works with other agencies to address elevated nitrate in groundwater. To help reduce domestic well owners' exposure to elevated nitrate in drinking water, the water district is offering rebates of up to $500 for eligible treatment systems. Call the Groundwater Hotline at (408) 630-2300 for more information.

Aluminum

Some people who drink water containing excess aluminum over many years may experience short-term gastrointestinal effects. Aluminum is typically naturally occurring.

Nickel

Some people who drink water containing excess nickel may experience liver and heart effects. Nickel is naturally occurring and may be found in discharges from metal factories.

Perchlorate

Perchlorate is a salt used for rocket fuel, highway flares, fireworks and other uses. Perchlorate can have adverse health effects at high levels as it can interfere with the thyroid gland, which can affect hormones that regulate metabolism and growth. Contamination from a former highway flare manufacturer in Morgan Hill was first discovered in 2000. At the urging of the water district and the community, the Central Coast Regional Water Quality Board has taken timely action to restore groundwater quality.

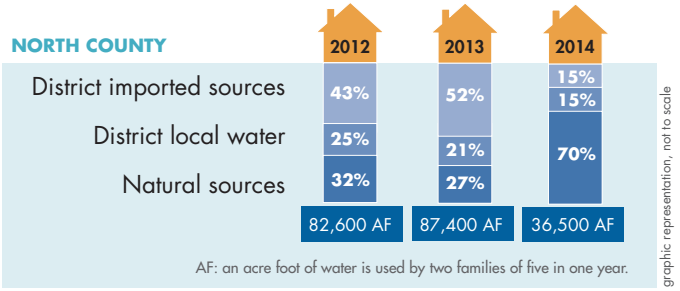
Due to cleanup activities and groundwater recharge, perchlorate levels have decreased significantly. The plume is also getting smaller, now approximately extending from Tennant Avenue south to the San Martin Airport area. A few water supply wells still contain perchlorate above the drinking water standard and remediation by the responsible party is ongoing.

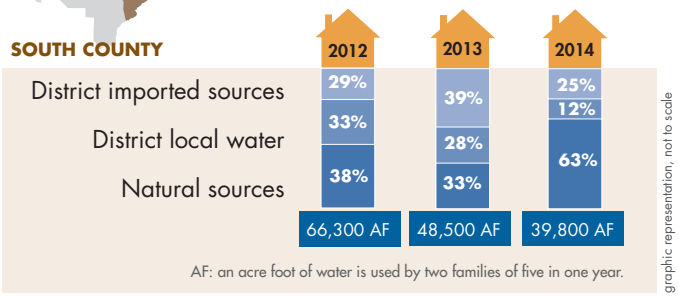
Chromium-6

Chromium-6, a suspected carcinogen, is a naturally occurring metal that is also used in several industrial processes. California's drinking water standard of 10 parts per billion (ppb) for Chromium-6 became effective on July 1, 2014.

You live on a groundwater basin

Groundwater recharge





Health and education information

Drinking water, including bottled water, may reasonably be expected to contain small amounts of some contaminants. The presence of contaminants does not necessarily indicate that the water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the United States Environmental Protection Agency's Safe Drinking Water Hotline at **1-800-426-4791**. You can obtain additional health information on the California's State Water Resources Control Board's Division of Drinking Water Programs website at **www.waterboards.ca.gov/drinking_water/programs** or by consulting your healthcare provider.

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Appendix B – 2014 Groundwater Quality Results by Subbasin and Zone

Table B-1 Summary of 2014 Water Quality Indicator Data

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain								Santa Clara Subbasin, Coyote Valley				Llagas Subbasin								Maximum Contaminant Levels	
		Shallow Zone[2]				Principal Zone[3]								Shallow Zone				Principal Zone					
		n[4]	Min[5]	Median[6]	Max	n	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	MCL[7]	SMCL[8]
Aggressive Index (Corrosivity)	INDEX	--	--	--	--	54	11.19	11.93	13	4	11.8	12	12	--	--	--	--	4	11.7	11.9	11.9	--	--
Alkalinity (Total) as CaCO3	mg/L	11	150	316	495	73	120	230	400	7	153	204	297	12	135	192.5	353	22	96	193.5	345	--	--
Alkalinity- Bicarbonate (as CaCO3)	mg/L	11	150	316	495	19	138	230	354	3	153	204	297	12	135	192.5	353	18	96	222.5	345	--	--
Alkalinity- Carbonate (as CaCO3)	mg/L	11	<5	<5	40	19	<5	<5	32	3	<5	<5	<5	12	<5	<5	<5	18	<5	<5	<5	--	--
Alkalinity- Hydroxide (as CaCO3)	mg/L	11	<5	<5	<5	19	<5	<5	<5	3	<5	<5	<5	12	<5	<5	<5	18	<5	<5	<5	--	--
Caffeine	ug/L	--	--	--	--	12	<0.05	<0.05	<0.05	7	<0.05	<0.05	<0.05	--	--	--	--	--	--	--	--	--	--
Carbonate Alkalinity	mg/L	11	<5	<5	24	69	<2	<5	19	7	<2	<5	<10	12	<5	<5	<5	22	<5	<5	<10	--	--
Color	UNITS	--	--	--	--	51	<3	<5	12	5	<3	<3	10	--	--	--	--	4	<3	<3	<3	--	15
E Coli	P/A 100ml	1	0 Absent	1 Present		--	--	--	--	10	10 Absent	0 Present		3	3 Absent	0 Present		6	6 Absent	0 Present		--	--
Foaming Agents (MBAS)	ug/L	--	--	--	--	50	<0.05	<0.05	<0.05	4	<0.05	<0.05	<0.05	--	--	--	--	4	<0.05	<0.05	<0.05	--	500
Hardness (Total) As CaCO3	mg/L	12	191	306	545	73	75	291	506	17	100	276	430	15	180	305	540	28	<10	253	531	--	--
Hydroxide Alkalinity	mg/L	11	<5	<5	<5	69	<1	<5	<5	7	<2	<5	<5	12	<5	<5	<5	22	<5	<5	<5	--	--
Langelier Index @ 60 C	INDEX	--	--	--	--	13	0.48	1.1	1.4	4	0.49	0.87	1	--	--	--	--	4	0.45	0.54	0.61	--	--
Langelier Index At Source Temp	INDEX	--	--	--	--	31	-0.87	-0.21	0.31	1	-0.1	-0.1	-0.1	--	--	--	--	3	-0.12	-0.15	0.01	--	--
Odor Threshold @ 60 C	TON	--	--	--	--	50	<1	<1	2	5	<1	<1	5	--	--	--	--	4	1	1	2	--	3
Oxidation Reduction Potential	mV	13	-90.7	77	160	8	-90	70.3	145.2	4	49	70.1	105	12	77	136.5	180	18	34.5	135	167	--	--
pH[10]	pH units	23	6.74	7.25	7.72	143	0.5	7.36	9.2	9	6.49	7.5	7.9	12	6.96	7.29	7.65	22	7.1	7.44	7.72	--	--
Source Temperature	C	23	16	20.1	21.4	35	16.9	19.8	23	5	17.2	18.7	20.2	12	17.2	19.8	22.8	18	17.4	20.1	24.8	--	--
Specific Conductance[10]	uS/cm	24	97	1031	1890	87	93	630	1150	20	449	660.5	1180	15	414	726	1206	86	450	602	1216	--	900
Total Coliform	P/A 100ml	1	0 Absent	1 Present		--	--	--	--	10	7 Absent	3 Present		3	2 Absent	1 Present		6	6 Absent	1 Present		--	--
Turbidity[10]	NTU	22	0.17	0.99	12.9	75	<0.1	0.39	523	12	0.083	2.55	21.2	12	0.61	1.06	3.48	22	<0.05	1.5	167	--	5

Notes:

Table includes data for wells monitored by the District (monitoring wells and water supply wells) and public water system data reported to the CA Division of Drinking Water (DDW)

Only wells with known construction information are presented in this table. DDW wells are assumed to represent the principal zone if no construction information is available, as these are typically deep wells.

1. mg/L = milligrams per liter; uS/cm = microSiemens per centimeter; NTU = Nephelometric Turbidity Units; TON = Threshold Odor Number
2. The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
3. The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet.
4. n = number of results for each parameter. Some parameters may have been analyzed more than once at a particular well.
5. The minimum shown is the lowest detected value. The lowest reporting limit (e.g., <5) is shown when there are no quantified values at the lowest reporting limit.
6. For parameters with results reported at multiple reporting limits, the median was computed using the Maximum Likelihood Estimate (MLE) method. In these cases, the upper bound of the estimate is presented.
7. MCL = Maximum Contaminant Level specified in Title 22 of the California Code of Regulations. The MCL is a health-based drinking water standard.
8. SMCL = Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA. For SMCLs having a range, the lower, recommended threshold is listed first with the upper threshold in parentheses.
9. A public water system collecting fewer than 40 samples per month is in violation of the total coliform MCL if more than one sample is total coliform positive or if there is a repeat positive for fecal coliform or E. coli. All wells sampled in 2014 were private domestic wells.
10. Summary statistics computed from combined laboratory and field measured data.

Table B-2 Summary of 2014 Inorganic Constituent Data

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain								Santa Clara Subbasin, Coyote Valley				Llagas Subbasin								Maximum Contaminant	
		Shallow Zone[2]				Principal Zone[3]								Shallow Zone				Principal Zone					
		n[4]	Min[5]	Median[6]	Max	n	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	MCL[7]	SMCL[8]
Major and Minor Ions																							
Bicarbonate (as HCO3)	mg/L	11	182	386	604	73	140	280	480	7	186	249	363	12	164	235.5	431	22	118	236.5	421	--	--
Bromide	mg/L	11	<0.05	0.15	0.33	19	<0.05	0.11	0.26	14	<0.05	0.11	0.7	12	<0.05	0.14	0.41	27	<0.1	0.16	0.53	--	--
Calcium	mg/L	8	11.8	52.9	107	71	16	60	120	7	6.2	45.6	57	12	39.1	63.9	84.7	22	32.9	53.9	105	--	--
Calcium (as CaCO3)	mg/L	14	29.5	143	335	21	39.7	115	236	3	15.4	114	123	12	97.7	159	212	18	82.3	144.5	262	--	--
Carbon Dioxide	mg/L	--	--	--	--	40	<2,000	20,000	90,000	3	<2,000	<2,000	<2,000	--	--	--	--	--	--	--	--	--	--
Chlorate	mg/L	--	--	--	--	2	64	66.5	69	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloride	ug/L	20	27	62	95	73	12	46	110	7	16	39	64	12	19	48	73	24	23	48	147	--	250
Cyanide	mg/L	--	--	--	--	75	<20	<100	<100	5	<5	<100	<100	--	--	--	--	8	<5	<5	<100	150	--
Fluoride (Natural Source)	mg/L	11	<0.05	0.1	0.16	76	<0.1	0.1	0.24	18	<0.1	0.15	0.54	12	<0.05	0.09	0.19	31	<0.1	0.12	0.3	2	--
Magnesium	ug/L	11	18.9	39.1	59.5	73	5.5	26.8	68	7	21.5	35	60	12	21.5	36.3	66	22	19.1	29.2	60	--	--
Perchlorate	mg/L	11	<4	<4	<4	80	<4	<4	<4	7	<4	<4	<4	12	<4	<4	5.43	87	<4	<4	5.9	6	--
Potassium	mg/L	11	0.7	1.3	2.6	69	<1	1.3	4	7	0.8	1.3	1.5	12	<0.5	1	1.6	22	<0.5	1.5	1.9	--	--
Silica	mg/L	11	8.5	21.6	30.9	19	15.5	24.2	36.8	3	13.5	19.3	31.7	12	20.6	24.8	37	18	20	25.6	37.6	--	--
Sodium	--	11	22.8	34.2	190	73	13.7	33	140	7	20	26	54	12	13.2	24.3	47.4	24	15.3	29.6	63.2	--	--
Sodium Adsorption Ratio (adjusted)	ratio	8	0.63	0.9	6.64	71	0.5	0.95	5.74	7	0.6	0.81	1.39	12	0.38	0.73	1.36	22	0.45	0.85	1.78		
Sulfate	mg/L	11	16.2	51.5	171	73	<0.5	45	110	17	1.4	41.8	63.8	12	19.9	38.6	59.5	29	16.7	37.8	129	--	250
Total Dissolved Solids (TDS)	mg/L	20	236	591	954	74	270	410	780	13	274	370	450	12	250	434	764	24	280	382	674	--	500
Nutrients																							
Nitrate (as NO3)	mg/L	12	0.212	6.4	30.1	250	<2	13	44.6	49	<2	15.2	74.8	12	8.7	49.2	135	133	<2	20.5	570	45	--
Nitrate + Nitrite (as N)	ug/L	--	--	--	--	45	<400	3,000	7,500	5	<400	1750	5600	--	--	--	--	5	3,000	4,000	5,200	10,000	--
Nitrite (as N)	ug/L	--	--	--	--	59	<200	<200	<400	18	<400	<400	400	--	--	--	--	21	300	327	400	1,000	--
Phosphate- Ortho	mg/L	11	<0.05	0.1	0.47	19	<0.05	0.1	1.74	13	<0.05	0.11	0.39	12	<0.05	0.1	0.24	23	<0.05	0.09	0.29	--	--
Trace Elements																							
Aluminum	ug/L	11	<20	27.55	150	91	<1	10.2	1700	10	<10	14.1	760	12	<20	34.8	95	26	<10	14.3	100	1,000	200
Antimony	ug/L	11	<1	<1	<1	84	0.01	0.008	0.022	8	<1	<6	<6	12	<1	<1	<1	26	<0.18	<1	<6	6	--
Arsenic	ug/L	11	<1	<1	1.25	84	0.25	0.48	4.8	9	<2	<2	2	12	<1	<1	<1	26	<1	<1	1.04	10	--
Asbestos	MFL	--	--	--	--	9	<0.2	<0.2	<0.2	3	<0.2	<0.2	<0.2	--	--	--	--	3	<0.2	1.1	4.6	7	--
Barium	ug/L	11	20	80	270	77	55	137.4	310	8	<100	119.4	270	12	13	105	350	26	<100	115	300	1,000	--
Beryllium	ug/L	11	<1	<1	<1	83	0	0.002	0.002	8	<1	<1	<1	12	<1	<1	<1	26	<0.19	<1	<1	4	--
Boron	ug/L	11	81.4	141	381	19	60	116	370	3	<50	103	117	12	<50	96.4	159	20	<50	92.8	181	--	--
Cadmium	ug/L	11	<0.2	<0.2	0.31	84	0	0.008	0.014	8	<0.2	<1	<1	12	<0.2	<0.2	<0.2	26	<0.14	<0.2	<1	5	--
Chromium- (Total)	ug/L	11	<1	1.2	2.4	85	<1	1.9	13	8	<1	0.84	18	12	<1	1.2	5.3	26	<1	1.7	12	50	--
Chromium- 6 (Hexavalent)	ug/L	12	<1	<1	3	83	<0.2	1.7	8.8	10	<1	1.55	4.9	12	<1	1.04	5.52	43	<1	<1	6.9	10	--
Cobalt	ug/L	11	<1	<1	<1	19	<1	<1	1.3	3	<1	<1	<1	12	<1	<1	<1	18	<1	<1	<1	--	--
Copper	ug/L	11	0.54	1.4	8.1	81	<0.5	1.4	8	7	<50	1.42	6	12	0.62	2.4	12.1	22	0.72	2.5	7.7	--	1,000
Iron	ug/L	11	<20	<20	3,400	138	<20	57.8	4,200	9	<20	76.1	1300	12	<20	26.8	120	25	<10	31.7	920	--	300
Lead	ug/L	11	<0.5	<0.5	2.3	81	0.06	0.2	5	8	<0.5	<5	<5	12	<0.5	<0.5	0.64	24	<1	<1	1.13	--	--
Lithium	ug/L	11	<5	7.5	16	19	<5	7.6	26	3	7.9	9.8	11	12	<5	8.4	28	18	<5	9	26	--	--
Manganese	ug/L	11	<1	3.8	424	93	0	1.4	170	7	3.2	13.7	70	12	<1	2.4	53.3	23	<1	2.4	120	--	50
Mercury	ug/L	11	<1	<1	<1	76	<1	<1	<1	8	<0.5	<1	<1	12	<1	<1	<1	27	<0.5	<0.5	<1	2	--
Molybdenum	ug/L	11	<1	<1	21	19	<1	1	9.4	3	<1	<1	<1	12	<1	<1	1.1	18	<1	<1	1.3	--	--
Nickel	ug/L	11	<1	1.4	3	86	<1	0.96	130	8	<1	<10	<10	12	<1	1.6	3.82	26	<0.21	<1	6.065	100	--
Selenium	ug/L	11	<5	<5	<5	83	0.24	1.2	7.5	8	<2	<5	<5	12	<5	<5	8	26	<2	<2	2	50	--
Silver	ug/L	11	<1	<1	<1	73	<1	<10	<10	7	<1	<10	<10	12	<1	<1	<1	22	<1	<1	<10	--	100
Thallium	ug/L	11	<1	<1	<1	80	0.01	0.008	0.008	8	<1	<1	<1	12	<1	<1	<1	26	<0.36	<1	<1	2	--
Vanadium	ug/L	11	<3	<3	3.5	19	<3	<3	6.1	3	<3	<3	9.3	12	<3	<3	14	18	<3	<3	12	--	--
Zinc	ug/L	11	<10	<10	97	81	1	2.11	2400	7	<10	<10	<50	12	<10	<10	12.9	22	<10	<10	140	--	5,000

Notes:

Table includes data for wells monitored by the District (monitoring wells and water supply wells) and public water system data reported to the CA Division of Drinking Water (DDW).

Only wells with known construction information are presented in this table. DDW wells are assumed to represent the principal zone if no construction information is available, as these are typically deep wells.

1. mg/L = milligrams per liter; ug/L = micrograms per liter; MFL = million fibers per liter.
2. The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
3. The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet.
4. n = number of results for each parameter. Some parameters may have been analyzed more than once at a particular well.
5. The minimum shown is the lowest detected value. The lowest reporting limit (e.g., <5) is shown when there are no quantified values at the lowest reporting limit.
6. For parameters with results with multiple reporting limits, the median was computed using the Maximum Likelihood Estimate (MLE) method. In these cases, the upper bound of the estimate is presented.
7. MCL = Maximum Contaminant Level specified in Title 22 of the California Code of Regulations. The MCL is a health-based drinking water standard.
8. SMCL = Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA. For SMCLs having a range, the lower, recommended threshold is listed first with the upper threshold in parentheses.

Table B-3 Summary of 2014 Volatile Organic Compound (VOC) Data

Parameter	Units[1]	Santa Clara Subbasin, Shallow Zone[2]			Santa Clara Subbasin, Principal Zone[3]			Santa Clara Subbasin, Coyote Valley			Llagas Subbasin, Shallow Zone			Llagas Subbasin, Principal Zone			Maximum Contaminant Levels	
		n[4]	Result[5]	RL[6]	n	Result	RL	n	Result	RL	n	Result	RL	n	Result	RL	MCL[7]	SMCL[8]
1,1,1,2-Tetrachlorethane	ug/L	1	ND	<0.5	28	ND	<0.5	3	ND	<0.5	NA	NA	NA	39	ND	<0.5	--	--
1,1,1-Trichloroethane	ug/L	1	D	0.58	97	D	<0.5	5	ND	<0.5	NA	NA	NA	39	ND	<0.5	200	--
1,1,2,2-Tetrachloroethane	ug/L	1	ND	<0.5	95	ND	<0.5	5	ND	<0.5	NA	NA	NA	39	ND	<0.5	1	--
1,1,2-Trichloro,1,2,2,Trifluoroethane (Freon 113)	ug/L	1	ND	<10	95	ND	<10	5	ND	<10	NA	NA	NA	39	ND	<10	1,200	--
1,1,2-Trichloroethane	ug/L	1	ND	<0.5	95	ND	<0.5	5	ND	<0.5	NA	NA	NA	39	ND	<0.5	5	--
1,1-Dichloroethane	ug/L	1	ND	<0.5	95	ND	<0.5	5	ND	<0.5	NA	NA	NA	39	ND	<0.5	5	--
1,1-Dichloroethylene	ug/L	1	ND	<0.5	95	D	<0.5	5	ND	<0.5	NA	NA	NA	39	ND	<0.5	6	--
1,1-Dichloropropene	ug/L	1	ND	<0.5	28	ND	<0.5	3	ND	<0.5	NA	NA	NA	39	ND	<0.5	--	--
1,2,3-Trichlorobenzene	ug/L	1	ND	<0.5	28	ND	<0.5	3	ND	<0.5	NA	NA	NA	39	ND	<0.5	--	--
1,2,3-Trichloropropane	ug/L	NA	NA	NA	42	ND	<0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--
1,2,4-Trichlorobenzene	ug/L	1	ND	<0.5	95	ND	<0.5	5	ND	<0.5	NA	NA	NA	39	ND	<0.5	5	--
1,2,4-Trimethylbenzene	ug/L	1	ND	<0.5	28	ND	<0.5	3	ND	<0.5	NA	NA	NA	39	ND	<0.5	--	--
1,2-Dichlorobenzene	ug/L	1	ND	<0.5	95	ND	<0.5	5	ND	<0.5	NA	NA	NA	39	ND	<0.5	600	--
1,2-Dichloroethane	ug/L	1	ND	<0.5	95	ND	<0.5	5	ND	<0.5	NA	NA	NA	39	ND	<0.5	0.5	--
1,2-Dichloropropane	ug/L	1	ND	<0.5	95	ND	<0.5	5	ND	<0.5	NA	NA	NA	39	ND	<0.5	5	--
1,3,5-Trimethylbenzene	ug/L	1	ND	<0.5	28	ND	<0.5	3	ND	<0.5	NA	NA	NA	39	ND	<0.5	--	--
1,3-Dichlorobenzene	ug/L	1	ND	<0.5	28	ND	<0.5	3	ND	<0.5	NA	NA	NA	39	ND	<0.5	--	--
1,3-Dichloropropane	ug/L	1	ND	<0.5	28	ND	<0.5	3	ND	<0.5	NA	NA	NA	39	ND	<0.5	--	--
1,3-Dichloropropene (Total)	ug/L	1	ND	<0.5	95	ND	<0.5	5	ND	<0.5	NA	NA	NA	39	ND	<0.5	0.5	--
1,4-Dichlorobenzene	ug/L	1	ND	<0.5	95	ND	<0.5	5	ND	<0.5	NA	NA	NA	39	ND	<0.5	5	--
1-Phenylpropane (N,Propylbenzene)	ug/L	1	ND	<0.5	28	ND	<0.5	3	ND	<0.5	NA	NA	NA	39	ND	<0.5	--	--
2,2-Dichloropropane	ug/L	1	ND	<0.5	14	ND	<0.5	3	ND	<0.5	NA	NA	NA	39	ND	<0.5	--	--
2,4-Dinitrotoluene	ug/L	NA	NA	NA	12	ND	<0.1	7	ND	<0.1	NA	NA	NA	NA	NA	NA	--	--
2-Chlorotoluene	ug/L	1	ND	<0.5	28	ND	<0.5	3	ND	<0.5	NA	NA	NA	39	ND	<0.5	--	--
4-Chlorotoluene	ug/L	1	ND	<0.5	28	ND	<0.5	3	ND	<0.5	NA	NA	NA	39	ND	<0.5	--	--
Benzene	ug/L	1	ND	<0.5	95	ND	<0.5	5	ND	<0.5	NA	NA	NA	39	ND	<0.5	1	--
Benzo (A) Pyrene	ug/L	NA	NA	NA	72	ND	<0.1	13	ND	<0.1	NA	NA	NA	10	ND	<0.1	0.2	--
Bromobenzene	ug/L	1	ND	<0.5	28	ND	<0.5	3	ND	<0.5	NA	NA	NA	39	ND	<0.5	--	--
Bromochloromethane	ug/L	1	ND	<0.5	28	ND	<0.5	3	ND	<0.5	NA	NA	NA	39	ND	<0.5	--	--
Bromodichloromethane (THM)	ug/L	1	ND	<1	29	D	<1	3	ND	<1	NA	NA	NA	39	ND	<1	--	--
Bromoform (THM)	ug/L	1	ND	<1	29	ND	<1	3	ND	<1	NA	NA	NA	39	ND	<1	--	--
Bromomethane	ug/L	1	ND	<0.5	14	ND	<0.5	3	ND	<0.5	NA	NA	NA	39	ND	<0.5	--	--
Carbon Disulfide	ug/L	1	ND	<0.5	13	ND	<0.5	2	ND	<0.5	NA	NA	NA	NA	NA	NA	--	--
Carbon Tetrachloride	ug/L	1	ND	<0.5	95	ND	<0.5	5	ND	<0.5	NA	NA	NA	39	ND	<0.5	0.5	--
Chloroethane	ug/L	1	ND	<0.5	14	ND	<0.5	3	ND	<0.5	NA	NA	NA	39	ND	<0.5	--	--
Chloroform (THM)	ug/L	1	ND	<1	29	D	<1	3	ND	<1	NA	NA	NA	39	ND	<1	--	--
Chloromethane	ug/L	1	ND	<0.5	14	ND	<0.5	3	ND	<0.5	NA	NA	NA	39	ND	<0.5	--	--
Cis-1,2-Dichloroethylene	ug/L	1	ND	<0.5	95	ND	<0.5	5	ND	<0.5	NA	NA	NA	39	ND	<0.5	6	--
Di(2-Ethylhexyl)Adipate	ug/L	NA	NA	NA	72	ND	<5	13	ND	<5	NA	NA	NA	10	ND	<5	400	--
Di(2-Ethylhexyl)Phthalate	ug/L	NA	NA	NA	72	ND	<3	13	ND	<3	NA	NA	NA	10	ND	<3	4	--
Dibromoacetic Acid (DBAA)	ug/L	NA	NA	NA	1	ND	<1	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--
Dibromochloromethane (THM)	ug/L	1	ND	<1	29	ND	<1	3	ND	<1	NA	NA	NA	39	ND	<1	--	--
Dibromochloropropane (DBCP)	ug/L	NA	NA	NA	59	ND	<0.01	10	ND	<0.01	NA	NA	NA	10	ND	<0.01	0.2	--
Dibromomethane	ug/L	1	ND	<0.5	28	ND	<0.5	3	ND	<0.5	NA	NA	NA	39	ND	<0.5	--	--
Dichloroacetic Acid (DCAA)	ug/L	NA	NA	NA	1	D	12.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--
Dichlorodifluoromethane (Freon 12)	ug/L	1	ND	<0.5	28	ND	<0.5	3	ND	<0.5	NA	NA	NA	39	ND	<0.5	--	--
Dichloromethane (Methyl Chloride)	ug/L	1	ND	<0.5	95	ND	<0.5	5	ND	<0.5	NA	NA	NA	39	ND	<0.5	5	--
Diisopropyl Ether	ug/L	1	ND	<3	28	ND	<3	3	ND	<3	NA	NA	NA	39	ND	<3	--	--
Ethylbenzene	ug/L	1	ND	<0.5	95	ND	<0.5	5	ND	<0.5	NA	NA	NA	39	ND	<0.5	300	--
Ethylene Dibromide (EDB)	ug/L	NA	NA	NA	59	ND	<0.02	10	ND	<0.02	NA	NA	NA	10	ND	<0.02	0.05	--
Ethyl-Tert-Butyl Ether	ug/L	1	ND	<3	28	ND	<3	3	ND	<3	NA	NA	NA	39	ND	<3	--	--
Haa5 - Haloacetic Acids (HAA5)	ug/L	NA	NA	NA	1	D	25.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	60	--
Hexachlorobutadiene	ug/L	1	ND	<0.5	28	ND	<0.5	3	ND	<0.5	NA	NA	NA	39	ND	<0.5	--	--
Isopropylbenzene	ug/L	1	ND	<0.5	28	ND	<0.5	3	ND	<0.5	NA	NA	NA	39	ND	<0.5	--	--
Methyl Ethyl Ketone (MEK- Butanone)	ug/L	1	ND	<5	28	ND	<5	3	ND	<5	NA	NA	NA	39	ND	<5	--	--
Methyl Isobutyl Ketone	ug/L	1	ND	<5	28	ND	<5	3	ND	<5	NA	NA	NA	39	ND	<5	--	--
Methyl-Tert-Butyl-Ether (MTBE)	ug/L	1	ND	<3	95	ND	<3	5	ND	<3	NA	NA	NA	39	ND	<3	13	5
Monobromoacetic Acid (MBAA)	ug/L	NA	NA	NA	1	ND	<1	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--
Monochloroacetic Acid (MCAA)	ug/L	NA	NA	NA	1	ND	<2	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--
Monochlorobenzene	ug/L	1	ND	<0.5	95	ND	<0.5	5	ND	<0.5	NA	NA	NA	39	ND	<0.5	70	--
M,P-Xylene	ug/L	1	ND	<0.5	28	ND	<0.5	3	ND	<0.5	NA	NA	NA	39	ND	<0.5	--	--
Naphthalene	ug/L	1	ND	<0.5	28	ND	<0.5	3	ND	<0.5	NA	NA	NA	39	ND	<0.5	--	--
N-Butylbenzene	ug/L	1	ND	<0.5	28	ND	<0.5	3	ND	<0.5	NA	NA	NA	39	ND	<0.5	--	--
O-Xylene	ug/L	1	ND	<0.5	28	ND	<0.5	3	ND	<0.5	NA	NA	NA	39	ND	<0.5	--	--
PCB-1016	ng/L	NA	NA	NA	26	ND	<0.5	10	ND	<0.5	NA	NA	NA	NA	NA	NA	0.5	--
PCB-1221	ng/L	NA	NA	NA	26	ND	<0.5	10	ND	<0.5	NA	NA	NA	NA	NA	NA	0.5	--
PCB-1232	ng/L	NA	NA	NA	26	ND	<0.5	10	ND	<0.5	NA	NA	NA	NA	NA	NA	0.5	--
PCB-1242	ng/L	NA	NA	NA	26	ND	<0.5	10	ND	<0.5	NA	NA	NA	NA	NA	NA	0.5	--
PCB-1248	ng/L	NA	NA	NA	26	ND	<0.5	10	ND	<0.5	NA	NA	NA	NA	NA	NA	0.5	--
PCB-1254	ng/L	NA	NA	NA	26	ND	<0.5	10	ND	<0.5	NA	NA	NA	NA	NA	NA	0.5	--
PCB-1260	ug/L	NA	NA	NA	26	ND	<0.5	10	ND	<0.5	NA	NA	NA	NA	NA	NA	--	--
P-Isopropyltoluene	ug/L	1	ND	<0.5	13	ND	<0.5	2	ND	<0.5	NA	NA	NA	NA	NA	NA	--	--

Table B-3 Summary of 2014 Volatile Organic Compound (VOC) Data

Parameter	Units[1]	Santa Clara Subbasin, Shallow Zone[2]			Santa Clara Subbasin, Principal Zone[3]			Santa Clara Subbasin, Coyote Valley			Llagas Subbasin, Shallow Zone			Llagas Subbasin, Principal Zone			Maximum Contaminant Levels	
		n[4]	Result[5]	RL[6]	n	Result	RL	n	Result	RL	n	Result	RL	n	Result	RL	MCL[7]	SMCL[8]
Polychlorinated Biphenyls (Total PCBs)	ug/L	NA	NA	NA	57	ND	<0.5	10	ND	<0.5	NA	NA	NA	10	ND	<0.5	0.5	--
Sec-Butylbenzene	ug/L	1	ND	<0.5	28	ND	<0.5	3	ND	<0.5	NA	NA	NA	39	ND	<0.5	--	--
Styrene	ug/L	1	ND	<0.5	95	ND	<0.5	5	ND	<0.5	NA	NA	NA	39	ND	<0.5	100	--
Tert-Amyl-Methyl Ether	ug/L	1	ND	<3	28	ND	<3	3	ND	<3	NA	NA	NA	39	ND	<3	--	--
Tert-Butyl Alcohol	ug/L	NA	NA	NA	1	ND	<2	NA	NA	NA	NA	NA	NA	39	ND	<2	--	--
Tert-Butylbenzene	ug/L	1	ND	<0.5	28	ND	<0.5	3	ND	<0.5	NA	NA	NA	39	ND	<0.5	--	--
Tetrachloroethene	ug/L	1	ND	<0.5	95	ND	<0.5	5	ND	<0.5	NA	NA	NA	39	D	<0.5	5	--
Toluene	ug/L	1	ND	<0.5	95	ND	<0.5	5	ND	<0.5	NA	NA	NA	39	ND	<0.5	150	--
Total Trihalomethanes	ug/L	1	ND	<0.5	14	D	<0.5	2	ND	<0.5	NA	NA	NA	NA	NA	NA	80	--
Trans-1,2-Dichloroethene	ug/L	1	ND	<0.5	95	ND	<0.5	5	ND	<0.5	NA	NA	NA	39	ND	<0.5	10	--
Trichloroacetic Acid (TCAA)	ug/L	NA	NA	NA	1	D	12.8	NA	NA	NA	NA	NA	NA	NA	NA	NA	--	--
Trichloroethene	ug/L	1	ND	<0.5	95	ND	<0.5	5	ND	<0.5	NA	NA	NA	39	ND	<0.5	5	--
Trichlorofluoromethane (Freon 11)	ug/L	1	ND	<5	95	ND	<5	5	ND	<5	NA	NA	NA	39	ND	<5	150	--
Vinyl Chloride	ug/L	1	ND	<0.5	97	ND	<0.5	5	ND	<0.5	NA	NA	NA	39	ND	<0.5	0.5	--
Xylenes (Total)	ug/L	1	ND	<0.5	80	ND	<0.5	4	ND	<0.5	NA	NA	NA	NA	NA	NA	1,750	--

Notes:

Table includes data for wells monitored by the District (monitoring wells and water supply wells) and public water system data reported to the CA Division of

Only wells with known construction information are presented in this table. DDW wells are assumed to represent the principal zone if no construction information is available, as

1. ug/L = micrograms per liter.
2. The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
3. The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet.
4. n = number of results for each parameter. Some parameters may have been analyzed more than once at a particular well.
5. ND= not detected above laboratory reporting limit. NA = not analyzed. D = detection above reporting limit.
6. RL = Laboratory reporting limit. In the case of multiple reporting limits, the highest limit is shown. NA is shown if the reporting limit is not available.
7. MCL = Maximum Contaminant Level specified in Title 22 of the California Code of Regulations. The MCL is a health-based drinking water standard.
8. SMCL = Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA.

Table B-4 Summary of 2014 Detected Volatile Organic Compounds (VOCs)

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain								Santa Clara Subbasin, Coyote Valley				Llagas Subbasin								Maximum Contaminant Levels	
		Shallow Zone[2]				Principal Zone[3]								Shallow Zone				Principal Zone					
		n[4]	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	MCL[7]	SMCL[8]
Bromodichloromethane (THM)	ug/L	1	<1	<1	<1	29	<1	<1	1.98	3	<1	<1	<1	--	--	--	--	39	<1	<1	<1	--	--
Chloroform (THM)	ug/L	1	<1	<1	<1	29	<1	<1	35.1	3	<1	<1	<1	--	--	--	--	39	<1	<1	<1	--	--
Tetrachloroethylene	ug/L	1	<0.5	<0.5	<0.5	95	<0.5	<0.5	<0.5	5	<0.5	<0.5	<0.5	--	--	--	--	39	<0.5	<0.5	3.5	5	--
1,1-Dichloroethylene	ug/L	1	<0.5	<0.5	<0.5	95	<0.5	<0.5	4.7	5	<0.5	<0.5	<0.5	--	--	--	--	39	<0.5	<0.5	<0.5	6	--
1,1,1-Trichloroethane	ug/L	1	0.6	0.58	0.58	97	<0.5	<0.5	2.8	5	<0.5	<0.5	<0.5	--	--	--	--	39	<0.5	<0.5	<0.5	200	--
Dichloroacetic Acid (DCAA)	ug/L	--	--	--	--	1	13	12.9	12.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Trihalomethanes	ug/L	1	<0.5	<0.5	<0.5	14	<0.5	12.9	37	2	<0.5	<0.5	<0.5	--	--	--	--	--	--	--	--	80	--
Trichloroacetic Acid (TCAA)	ug/L	--	--	--	--	1	13	12.8	12.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Haa5 , Haloacetic Acids (HAA5)	ug/L	--	--	--	--	1	26	25.6	25.6	--	--	--	--	--	--	--	--	--	--	--	--	60	--

Notes:

Table includes data for wells monitored by the District (monitoring wells and water supply wells) and public water system data reported to the CA Division of Drinking Water (DDW).

Only wells with known construction information are presented in this table. DDW wells are assumed to represent the principal zone if no construction information is available, as these are typically deep wells.

1. ug/L = micrograms per liter.
2. The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
3. The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet.
4. n = number of results for each parameter. Some parameters may have been analyzed more than once at a particular well.
5. The minimum shown is the lowest detected value. The lowest reporting limit (e.g., <5) is shown when there are no quantified values at the lowest reporting limit.
6. For parameters with results with multiple reporting limits, the median was computed using the Maximum Likelihood Estimate method. In these cases, the upper bound of the estimate is presented.
7. MCL = Maximum Contaminant Level specified in Title 22 of the California Code of Regulations. The MCL is a health-based drinking water standard.
8. SMCL = Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA.

Table B-5 Summary of 2014 Pesticide Data

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain						Santa Clara Subbasin, Coyote Valley			Llagas Subbasin						Maximum Contaminant Levels	
		Shallow Zone[2]			Principal Zone[3]						Shallow Zone			Principal Zone				
		n[4]	Result[5]	RL[6]	n	Result	RL	n	Result	RL	n	Result	RL	n	Result	RL	MCL[7]	SMCL[8]
2,3,7,8-TCDD (Dioxin)	ug/L	NA	NA	NA	58	ND	<0.000005	8	ND	<0.000005	NA	NA	NA	10	ND	<0.000005	0.00003	--
2,4,5-TP (Silvex)	ug/L	NA	NA	NA	73	ND	<1	10	ND	<1	NA	NA	NA	11	ND	<1	50	--
2,4-D	ug/L	NA	NA	NA	73	ND	<10	10	ND	<10	NA	NA	NA	11	ND	<10	70	--
3-Hydroxycarbofuran	ug/L	NA	NA	NA	50	ND	<3	10	ND	<3	NA	NA	NA	10	ND	<3	--	--
Alachlor	ug/L	NA	NA	NA	57	ND	<1	13	ND	<1	NA	NA	NA	11	ND	<1	2	--
Aldicarb	ug/L	NA	NA	NA	50	ND	<3	10	ND	<3	NA	NA	NA	10	ND	<3	--	--
Aldicarb Sulfone	ug/L	NA	NA	NA	50	ND	<4	10	ND	<4	NA	NA	NA	10	ND	<4	--	--
Aldicarb Sulfoxide	ug/L	NA	NA	NA	50	ND	<3	10	ND	<3	NA	NA	NA	10	ND	<3	--	--
Aldrin	ug/L	NA	NA	NA	43	ND	<0.075	7	ND	<0.075	NA	NA	NA	10	ND	<0.075	--	--
Atrazine	ug/L	NA	NA	NA	57	ND	<0.5	13	ND	<0.5	NA	NA	NA	11	ND	<0.5	1	--
Bentazon	ug/L	NA	NA	NA	73	ND	<2	10	ND	<2	NA	NA	NA	11	ND	<2	18	--
Bromacil	ug/L	NA	NA	NA	43	ND	<10	7	ND	<10	NA	NA	NA	10	ND	<10	--	--
Butachlor	ug/L	NA	NA	NA	43	ND	<0.38	7	ND	<0.38	NA	NA	NA	10	ND	<0.38	--	--
Carbaryl	ug/L	NA	NA	NA	62	ND	<5	10	ND	<5	NA	NA	NA	10	ND	<5	--	--
Carbofuran	ug/L	NA	NA	NA	67	ND	<5	10	ND	<5	NA	NA	NA	10	ND	<5	18	--
Chlordane	ug/L	NA	NA	NA	57	ND	<0.1	10	ND	<0.1	NA	NA	NA	10	ND	<0.1	0.1	--
Chlorothalonil	ug/L	NA	NA	NA	27	ND	<5	NA	NA	NA	NA	NA	NA	10	ND	<5	--	--
Cis-1,3-Dichloropropene	ug/L	1	ND	<0.5	14	ND	<0.5	3	ND	<0.5	NA	NA	NA	39	ND	<0.5	0.5	--
Dalapon	ug/L	NA	NA	NA	73	ND	<10	10	ND	<10	NA	NA	NA	11	ND	<10	200	--
DCPA (Total Di & Mono Acid Degradates)	ug/L	NA	NA	NA	12	ND	<0.1	5	ND	<0.1	NA	NA	NA	NA	NA	NA	--	--
Diazinon	ug/L	NA	NA	NA	12	ND	<0.1	7	ND	<0.1	NA	NA	NA	NA	NA	NA	--	--
Dicamba	ug/L	NA	NA	NA	43	ND	<1.5	5	ND	<1.5	NA	NA	NA	11	ND	<1.5	--	--
Dieldrin	ug/L	NA	NA	NA	43	ND	<0.02	5	ND	<0.02	NA	NA	NA	10	ND	<0.02	--	--
Dimethoate	ug/L	NA	NA	NA	12	ND	<0.1	7	ND	<0.1	NA	NA	NA	NA	NA	NA	--	--
Dinoseb	ug/L	NA	NA	NA	73	ND	<2	10	ND	<2	NA	NA	NA	11	ND	<2	7	--
Diquat	ug/L	NA	NA	NA	55	ND	<4	10	ND	<4	NA	NA	NA	10	ND	<4	20	--
Endothall	ug/L	NA	NA	NA	55	ND	<45	10	ND	<45	NA	NA	NA	10	ND	<45	100	--
Endrin	ug/L	NA	NA	NA	57	ND	<0.1	10	ND	<0.1	NA	NA	NA	10	ND	<0.1	2	--
Gamma-BHC (Lindane), Total	ug/L	NA	NA	NA	57	ND	<0.2	12	ND	<0.2	NA	NA	NA	10	ND	<0.2	0.2	--
Glyphosate	ug/L	NA	NA	NA	55	ND	<25	10	ND	<25	NA	NA	NA	10	ND	<25	700	--
Heptachlor	ug/L	NA	NA	NA	57	ND	<0.01	10	ND	<0.01	NA	NA	NA	10	ND	<0.01	0.01	--
Heptachlor Epoxide	ug/L	NA	NA	NA	57	ND	<0.01	10	ND	<0.01	NA	NA	NA	10	ND	<0.01	0.01	--
Hexachlorobenzene	ug/L	NA	NA	NA	57	ND	<0.5	12	ND	<0.5	NA	NA	NA	10	ND	<0.5	1	--
Hexachlorocyclopentadiene	ug/L	NA	NA	NA	57	ND	<1	12	ND	<1	NA	NA	NA	10	ND	<1	50	--
Methiocarb	ug/L	NA	NA	NA	12	ND	<0.5	5	ND	<0.5	NA	NA	NA	NA	NA	NA	--	--
Methomyl	ug/L	NA	NA	NA	62	ND	<2	10	ND	<2	NA	NA	NA	10	ND	<2	--	--
Methoxychlor	ug/L	NA	NA	NA	57	ND	<10	12	ND	<10	NA	NA	NA	10	ND	<10	30	--
Metolachlor	ug/L	NA	NA	NA	12	ND	<0.05	7	ND	<0.05	NA	NA	NA	NA	NA	NA	--	--
Metribuzin	ug/L	NA	NA	NA	12	ND	<0.05	7	ND	<0.05	NA	NA	NA	NA	NA	NA	--	--
Molinate	ug/L	NA	NA	NA	57	ND	<2	13	ND	<2	NA	NA	NA	10	ND	<2	20	--
Oxamyl	ug/L	NA	NA	NA	67	ND	<20	10	ND	<20	NA	NA	NA	10	ND	<20	50	--
Pentachlorophenol	ug/L	NA	NA	NA	73	ND	<0.2	10	ND	<0.2	NA	NA	NA	11	ND	<0.2	1	--
Picloram	ug/L	NA	NA	NA	73	ND	<1	10	ND	<1	NA	NA	NA	11	ND	<1	500	--
Propachlor	ug/L	NA	NA	NA	43	ND	<0.5	7	ND	<0.5	NA	NA	NA	10	ND	<0.5	--	--
Propoxur	ug/L	NA	NA	NA	12	ND	<0.5	5	ND	<0.5	NA	NA	NA	NA	NA	NA	--	--
Simazine	ug/L	NA	NA	NA	57	ND	<1	13	ND	<1	NA	NA	NA	11	ND	<1	4	--

Table B-5 Summary of 2014 Pesticide Data

Parameter	Units [1]	Santa Clara Subbasin, Santa Clara Plain						Santa Clara Subbasin, Coyote Valley			Llagas Subbasin						Maximum Contaminant Levels	
		Shallow Zone[2]			Principal Zone[3]						Shallow Zone			Principal Zone				
		n[4]	Result[5]	RL[6]	n	Result	RL	n	Result	RL	n	Result	RL	n	Result	RL	MCL[7]	SMCL[8]
Thiobencarb	ug/L	NA	NA	NA	57	ND	<1	13	ND	<1	NA	NA	NA	10	ND	<1	70	1
Toxaphene	ug/L	NA	NA	NA	57	ND	<1	10	ND	<1	NA	NA	NA	10	ND	<1	3	--
Trans-1,3-Dichloropropene	ug/L	1	ND	<0.5	14	ND	<0.5	3	ND	<0.5	NA	NA	NA	39	ND	<0.5	--	--

Notes:

Table includes data for wells monitored by the District (monitoring wells and water supply wells) and public water system data reported to the CA Division of Drinking Water (DDW).

Only wells with known construction information are presented in this table. DDW wells are assumed to represent the principal zone if no construction information is available, as these are typically deep wells.

1. ug/L = micrograms per liter.
2. The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
3. The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet.
4. n = number of results for each parameter. Some parameters may have been analyzed more than once at a particular well.
5. ND= not detected above laboratory reporting limit. NA = not analyzed. D = detection above reporting limit.
6. RL = Laboratory reporting limit. In the case of multiple reporting limits, the highest limit is shown. NA is shown if the reporting limit is not available.
7. MCL = Maximum Contaminant Level specified in Title 22 of the California Code of Regulations. The MCL is a health-based drinking water standard.
8. SMCL = Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA

Table B-6 Summary of 2014 Radioactive Constituent Data

Parameter	Units[1]	Santa Clara Subbasin, Santa Clara Plain								Santa Clara Subbasin, Coyote Valley				Llagas Subbasin								Maximum Contaminant Levels	
		Shallow Zone[2]				Principal Zone[3]								Shallow Zone				Principal Zone					
		n[4]	Min[5]	Median[6]	Max	n	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	n	Min	Median	Max	MCL[7]	SMCL[8]
Gross Alpha	pCi/L	--	--	--	--	39	-3	0.96	4.2	6	-3	1.2	6.3	--	--	--	--	10	-3.000	-3	0.910	15	--
Gross Alpha Counting Error	pCi/L	--	--	--	--	39	0.19	0.7	2.17	6	0.22	1.4	3	--	--	--	--	10	0.11	0.21	1.2	--	--
Gross Alpha MDA95	pCi/L	--	--	--	--	39	0.95	1.7	3	6	1.15	1.53	3	--	--	--	--	10	1.16	1.16	1.26	5	--
Radium 228	pCi/L	--	--	--	--	3	-1	-0.1	0.54	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Radium 228 Counting Error	pCi/L	--	--	--	--	2	0.43	0.56	0.69	--	--	--	--	--	--	--	--	--	--	--	--	20	--
Radium 228 MDA95	pCi/L	--	--	--	--	3	0.46	0.9	1.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Uranium	pCi/L	--	--	--	--	12	-1	0.399	1.38	1	-1	-1	-1	--	--	--	--	--	--	--	--	--	--

Notes:

Table includes data for wells monitored by the District (monitoring wells and water supply wells) and public water system data reported to the CA Division of Drinking Water (DDW).

Only wells with known construction information are presented in this table. DDW wells are assumed to represent the principal zone if no construction information is available, as these are typically deep wells.

1. pCi/l = picocuries per liter; mrem/yr = millirem per year.
2. The shallow aquifer zone is represented by wells primarily drawing water from depths less than 150 feet.
3. The principal aquifer zone is represented by wells primarily drawing water from depths greater than 150 feet.
4. n = number of results for each parameter. Some parameters may have been analyzed more than once at a particular well.
5. The minimum shown is the lowest detected value. The lowest reporting limit (e.g., <5) is shown when there are no quantified values at the lowest reporting limit.
6. For parameters with results with multiple reporting limits, the median was computed using the Maximum Likelihood Estimate (MLE) method. In these cases, the upper bound of the estimate is presented.
7. MCL = Maximum Contaminant Level specified in Title 22 of the California Code of Regulations. The MCL is a health-based drinking water standard.
8. SMCL = Secondary Maximum Contaminant Level, or aesthetic-based standard, per DDW or US EPA.

MANAGED RECHARGED

groundwater monitoring

WELL PERMIT INSPECTION

recharge water quality sampling

LAND SUBSIDENCE

wells reporting groundwater use

MANAGED RECHARGED GROUNDWATER MONITORING

GROUNDWATER QUALITY

recharge water quality sampling GROUNDWATER PUMPING

WELLS REPORTING GROUNDWATER USE MANAGED RECHARGED

groundwater levels and storage

GROUNDWATER ANNUAL REPORT

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GROUNDWATER LEVELS AND STORAGE

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well permit inspection

RECHARGE WATER QUALITY SAMPLING wells reporting groundwater use

GROUNDWATER QUALITY

wells reporting groundwater use

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